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POLLUTION PREVENTION PROGRAMS

A CASE STUDY OF THE STATUS OF P2 PROGRAMS ON

WHITEMAN AIR FORCE BASE, MISSOURI

WITH COMPARISON TO SALT LAKE CITY, UTAH AND

SALT LAKE COUNTY, UTAH

Research Paper Prepared By

DAVID H. McCRAY, Major, USAF

Environmental LL.M. Candidate

University of Utah, College of Law

Abstract for Maj David McCray's Paper: (LL.M. Candidate University of Utah, College of Law, May 1999)

Titled:

POLLUTION PREVENTION PROGRAMS

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WITH COMPARISON TO SALT LAKE CITY, UTAH AND

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Overview:

Congress recognized the potential for serious harm to the environment and to human health and enacted several different legislative acts that were designed to prevent such harm.¹ Congress stated the policy of the United States regarding pollution prevention when it enacted the Pollution Prevention Act of 1990 (PPA):²

“The Congress hereby declares it to be the national policy of the United States that pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.”³

Congress clearly identified the preferences in the treatment of waste in the above stated policy--pollution should be prevented at the source. Preventing pollution at its source was a

¹ This paper discusses just a few of the many Acts that have been passed and contains a brief discussion of the Pollution Prevention Act, Clean Air Act, Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as well as Air Force Instructions regarding P2. There are numerous other Acts that work to preserve and protect the environment but are outside the scope of this project.

² 42 U.S.C.A. § 13101 - 13109

major departure from earlier environmental statutes that focused on the treating of the waste, not the prevention of waste.

The Office of the President has also issued several executive orders (EOs) specifically dealing with waste minimization and pollution prevention. This paper will discuss some of the EOs that apply.

Congress and the EOs have taken away some of the choices that industry and the government had regarding the treatment of waste. However, the choice is still available as to whether to just comply with the minimum requirements or to surpass the requirements, thereby having a stronger impact on the health of the environment and humanity.

The United States Air Force has made some landmark choices in the management of waste and has taken a very proactive role and their programs are part of the main topic of this research paper. One purpose of this paper is to review certain environmental regulations and to see how the Air Force complied with these regulations. This review will cover the regulations and guidelines implemented by the Air Force, reasons why they selected certain methodologies, equipment used to achieve goals and some pollution prevention (P2) success stories. Specifically, I will focus on Whiteman AFB in Missouri and its environmental management program.

The second major portion of this paper is to analyze whether or not Whiteman's and other Air Force success stories in the P2 arena can be applied to civilian communities and industry. Industry has made major strides in P2, mostly to reduce cost and exposure to liability, which is not an insignificant reason for making the change. There are also some communities that are working to recycle and reuse resources, but are they doing enough? My contention is that these

communities can use the programs developed by the Air Force and make a significant impact on their management and elimination of waste.

For example, what do communities do with green waste they pick up from your curb and city parks? How do they treat oil, antifreeze and solvents recovered from their city transportation system and government fleet vehicles? Does the community recycle bottles, cans, cardboard, etc.? What is the size of their recycling program? What is the emphasis on reducing waste streams? These are just some of the issues handled by Whiteman AFB that a municipality may be able to implement in an efficient and productive manner.

The paper then discusses important definitions related to the topic for clarification purposes. With these few definitions explained, it is important next to turn to the more prevalent statutes that discuss pollution prevention and waste minimization. This discussion is brief and not meant as an all-inclusive analysis of the legislation. The paper then looks at the EPA's suggested successful P2 program.

The case study of Whiteman AFB follows this section. A critical look at the methods and procedures Whiteman has implemented is undertaken. The program is then compared to the EPA's suggested program.

Next, a look at Salt Lake City and Salt Lake County's P2 program. Telephone interviews were completed with individuals involved in the process and the findings are reported in the paper.

Finally, the conclusion lists 10 steps that the City and County should pursue in order to establish a viable P2 program and also discusses the necessity for, and benefits of such action

Sources used in Maj McCray's paper: (shown in order of appearance)

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3. Air Force Instruction 32-7080, *Pollution Prevention Program*, pg. 16 (12 May 1994)
4. The Pollution Prevention Act §6602
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29. Dave Lyon, Heavy Shop Service Manager, Fleet Management Division (Telephone Interview conducted on April 2, 1999).
30. Margaret Grochocki, Public & Recycling Information Officer for the Salt Lake Valley Recycling Information Office. (Telephone Interview conducted 1 April, 1999)
31. Salt Lake Valley Solid Waste Management Facility, Compost Project Summary
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I. INTRODUCTION

The United States is a prosperous country. We are a country that is full of choices, especially in the area of consumable products and resources. Hardly a day goes by that we are not inundated with "new and improved" products. Our stores are filled with choices. Packaging of products to get your attention is an art and in many cases is simply excessive. Look at how most software programs are packaged, many of these large boxes only contain a compact disk. The manufacturers believe that just the disk on the shelf would be less competitive because the consumer may not notice it. We have shelves filled with toothpaste, cereals, snack items, paper products, batteries, and countless other items.

We do have choices, but not just in the area of what products or resources we buy or consume. We also have choices in how we are going to consume these resources and if we are going to be more responsible in our consumption. Consumption leads to waste and improper management of the waste creates many problems.

Congress recognized the potential for serious harm to the environment and to human health and enacted several different legislative acts that were designed to prevent such harm.¹ Congress stated the policy of the United States regarding pollution prevention when it enacted the Pollution Prevention Act of 1990 (PPA):²

"The Congress hereby declares it to be the national policy of the United States that pollution should be prevented or reduced at the source whenever feasible;

¹ This paper discusses just a few of the many Acts that have been passed and contains a brief discussion of the Pollution Prevention Act, Clean Air Act, Resource Conservation and Recovery Act and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as well as Air Force Instructions regarding P2. There are numerous other Acts that work to preserve and protect the environment but are outside the scope of this project.

² 42 U.S.C.A. § 13101 - 13109

pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner.”³

Congress clearly identified the preferences in the treatment of waste in the above stated policy--pollution should be prevented at the source. Preventing pollution at its source was a major departure from earlier environmental statutes that focused on the treating of the waste, not the prevention of waste.

The Office of the President has also issued several executive orders (EOs) specifically dealing with waste minimization and pollution prevention. This paper will discuss some of the EOs that apply.

Congress and the EOs have taken away some of the choices that industry and the government had regarding the treatment of waste. However, the choice is still available as to whether to just comply with the minimum requirements or to surpass the requirements, thereby having a stronger impact on the health of the environment and humanity.

The United States Air Force has made some landmark choices in the management of waste and has taken a very proactive role and their programs are part of the main topic of this research paper. One purpose of this paper is to review certain environmental regulations and to see how the Air Force complied with these regulations. This review will cover the regulations and guidelines implemented by the Air Force, reasons why they selected certain methodologies, equipment used to achieve goals and some pollution prevention (P2) success stories. Specifically, I will focus on Whiteman AFB in Missouri and its environmental management program.

The second major portion of this paper is to analyze whether or not Whiteman's and other Air Force success stories in the P2 arena can be applied to civilian communities and industry. Industry has made major strides in P2, mostly to reduce cost and exposure to liability, which is not an insignificant reason for making the change. There are also some communities that are working to recycle and reuse resources, but are they doing enough? My contention is that these communities can use the programs developed by the Air Force and make a significant impact on their management and elimination of waste.

For example, what do communities do with green waste they pick up from your curb and city parks? How do they treat oil, antifreeze and solvents recovered from their city transportation system and government fleet vehicles? Does the community recycle bottles, cans, cardboard, etc.? What is the size of their recycling program? What is the emphasis on reducing waste streams? These are just some of the issues handled by Whiteman AFB that a municipality may be able to implement in an efficient and productive manner.

1. Clarification of Environmental Terms

Individuals without a strong background in the P2 environment may find some of the concepts and terms confusing upon reading this paper. As an example, what is the difference between waste reduction and waste prevention? The actual definitions may be surprising and therefore, a brief discussion of terms is necessary at this point.

³ Id. at § 13101(b)

This paper focuses on pollution prevention or P2. A reading of the PPA elicits no actual definition using the words "pollution prevention". Rather, the PPA uses the term "source reduction."⁴ Source reduction means, "any practice which

(1) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and

(2) reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants."⁵

EO 13101, titled Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition⁶, incorporates the statutory definition of source reduction in its definition of pollution prevention. However, the EO expands the definition by adding "and other practices that reduce or eliminate the creation of pollutants through: a) increased efficiency in the use of raw materials, energy, water, or other resources; or b) protection of natural resources by conservation."⁷

Finally, the Air Force's definition of pollution prevention is found in Air Force Instruction (AFI) 32-7080 and combines the two definitions above (although it was written 4 years before the EO). The definition is more succinct and encompasses all actions necessary "to include, use of processes, practices, products or management

⁴ Id. at § 13102(5)

⁵ Id. The definition of source reduction does not include, as stated in § 13102(B), "any practice which alters the physical, chemical, or biological characteristics or the volume of a hazardous substance, pollutant, or contaminant through a process or activity which itself is not integral to an necessary for the production of a product or the providing of a service." This exclusion from the definition of source reduction simply states if you are treating the waste as part of the management system, you are not reducing the waste, but making it more environmentally friendly. Fugitive emissions are such things as dust created from a construction dirt road. These emissions are collected by any type of containment system.

⁶ Executive Order 13101--*Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition*, Federal Register September 16, 1998 (Vol. 63, No. 179, pg. 49644)

actions, that eliminate or reduce undesirable impacts on human health and the environment.”⁸ All three definitions focus on the elimination of waste at the source of generation with the goal of reducing or eliminating the waste and therefore the need for its treatment and or disposal.

So what about the difference between “waste prevention” and “waste reduction”?

Waste prevention refers to the “changes in the design, manufacturing, purchase, or use of materials or products (including packaging) to reduce their amount or toxicity before they are discarded. Waste prevention also refers to the reuse of products or materials.”⁹

AFI 32-7080 refers to this action as “waste minimization.”¹⁰

Waste reduction is defined as the “preventing or decreasing the amount of waste being generated through waste prevention, recycling, or purchasing recycled and environmentally preferable products.”¹¹

With these few definitions explained, it is important next to turn to the more prevalent statutes that discuss pollution prevention and waste minimization. This discussion will be brief and not meant as an all-inclusive analysis of the legislation.

⁷ Id. at p. 49644

⁸ Air Force Instruction 32-7080, *Pollution Prevention Program*, pg. 16 (12 May 1994). Note that AFIs were formally known as Air Force Regulations. The AFI further defines a hierarchy of the actions as “source reduction, recycling, treatment, and disposal or means “source reduction” and other practices that reduce or eliminate the creation of pollutants through increased efficiency in the use of raw materials, energy, water, other natural resources, and the protection of natural resources.” Additionally, the AFI has a more specific definition of “source reduction.” It defines source reduction as “any practice which reduces or eliminates any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise residual waste generation at the source, usually within the generation process. The term includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, feed stock substitutions, improvements in feed stock purity, shipping and packaging modifications, improvements in housekeeping, maintenance, training, and management practices, increases in machinery efficiency, and recycling within a process.”

⁹ Supra note 6 at p. 49644, section 208

¹⁰ Supra note 8 at p. 16

II. STATUTES AND REGULATIONS

The purpose of this section is to look briefly at the key pollution prevention and waste minimization statutes that affect business and the government. Additionally, I will explore executive orders and Department of Defense (DOD) and Air Force regulations that state policy and procedures on meeting requirements.

A. Pollution Prevention Act

This relatively short piece of legislation established Congress' position in changing the status quo regarding pollution control methods. Congress sets out the need for change in the findings section of the Act.¹² In the findings section, Congress recognized that this country produces millions of tons of pollution annually and spends billions of dollars trying to control pollution. There are significant opportunities to reduce or prevent "pollution at the source through cost-effective changes in production, operation, and raw materials use."¹³ Congress highlighted the fact that these methods could save industry a substantial amount of money while helping to protect the environment and increase worker health and safety. Congress also found that it was difficult for industry to apply source reduction principles since existing regulation focused upon treatment and disposal. Finally, Congress admonished the EPA saying it needs to address "the historic lack of attention to source reduction" and to establish a

¹¹ Supra note 6 at pg 49644, section 209

¹² Supra note 2 at 42 U.S.C.A. §13101(a) and the PPA §6602

¹³ Id

source reduction program that gives information to the States and provides financial assistance.¹⁴

The PPA also set up grants to States for technical assistance programs¹⁵ and established a source reduction clearinghouse with the purpose of gathering data and establishing a computer database on management, technical and operational approaches to source reduction.¹⁶ The database is open to anyone who may want the information, including the public.¹⁷ Finally, the Act required the States to report on source reduction and recycling data collection and practices, and the EPA to report to Congress.¹⁸ Congress wanted more information on the progress of source reduction and required the EPA to file a biennial report that covered nine areas.¹⁹ These areas allow for Congress to ensure that EPA is constantly looking to improve the source reduction program, while giving Congress hard data on the progress.

The PPA set the standards for a different mode of operation and thinking--changing the focus from treatment and disposal to source reduction. It does not have any numeric limitations on pollution reduction, rather it requires that the opportunities for source

¹⁴ Id at (a)(4) and (a)(5)

¹⁵ Id at §13104

¹⁶ Id at § 13105. The Act specifies that the Administrator shall use the clearinghouse to "serve as a transfer center for source reduction technology transfer; 2) mount active outreach and education programs by the States to further the adoption of source reduction technologies; and 3) collect and compile information reported by States receiving grants under section 13104 of this title on the operation and success of State source reduction programs."

¹⁷ Id.

¹⁸ Id at §§13106 and 13107

¹⁹ Id at § 13107(b). The nine areas are: 1) an analysis of the data collected under section 13106 by industry, 2) analysis of the usefulness and validity of the data collected for measuring trends in source reduction, 3) identification of regulatory barriers to source reduction and incentives and disincentives to promote and assist source reduction, 4) identification of industries and pollutants that require priority assistance in multi media source reduction, 5) recommendations as to incentives needed to encourage investment and research and development in source reduction, 6) identification of opportunities and development of priorities for research and development in source reduction methods and techniques, 7) an evaluation of cost and technical feasibility, by industry and process, of opportunities and of any industries that may have significant barriers to source reduction, 8) an evaluation of methods of coordinating, streamlining, and improving public access to data, and 9) an evaluation of gaps in data and duplication.

reduction be explored and implemented when practicable and therefore, lacks true enforceability.

B. The Resource Conservation and Recovery Act (RCRA)

RCRA²⁰ focuses more on the management of hazardous waste streams and clean up activities of certain wastes. Interestingly though, it also advocated the national policy of reducing or eliminating the generation of hazardous waste as expeditiously as possible.²¹ The Act recognized that hazardous waste was in fact still going to be generated and in compliance with the national policy, this waste “should be treated, stored, or disposed of so as to minimize the present and future threat to human health and the environment.”²²

Congress found that the past controls for disposing and working with hazardous wastes did impose serious threats to human health and the environment. Congress looked at the issue pragmatically stating that open dumping in and on the land without careful controls presents such dangers as contamination of drinking water from underground and surface supplies, and pollutes the air and the land.²³ Congress also recognized the importance of careful management to avoid “expensive, complex and time consuming corrective actions.”²⁴ Additionally, Congress focused on the advantages such controls would have on materials and energy sources for this country.²⁵

²⁰ 42 U.S.C.A. §§ 6901-6992k (1995); Pub.L. 89-272, Title II, § 1002, as added Pub.L. 94-580, § 2, Oct. 21, 1976, 90 Stat. 2796, and amended Pub.L. 95-609, § 7(a), Nov. 8, 1978, 92 Stat. 3081; Pub.L. 98-616, Title I, § 101(a), Nov. 8, 1984, 98 Stat. 3224; current through P.L. 104-45, approved Nov. 8, 1995.

²¹ Id at § 6902 (b).

²² Id

²³ Id at § 6901 (b) (2 & 4)

²⁴ Id at § 6901 (b) (6)

²⁵ Id at § 6901 (c) and (d). As to materials, the Congress found that “millions of tons of recoverable material which could be used are needlessly buried each year; that methods are available to separate usable materials from solid waste; and the recovery and conservation of such materials can reduce the dependence of the United States on foreign resources and reduce the deficit in its balance of payments.” Regarding how such a program can effect energy, the Congress stated that “solid waste represents a potential source of solid fuel, oil, or gas that can be converted into energy; the need exists to develop alternative energy

RCRA attempts to control hazardous waste from its creation to disposal, also known as "cradle-to-grave" management. It regulates five types of disposal activities: "hazardous waste, solid waste, underground storage tanks, oil waste and medical waste."²⁶ Moya and Fono point out in their book that a tremendous amount of waste was being generated and cite that between "1968 and 1988, municipal solid waste alone increased from 140 million tons to 180 million tons per year."²⁷ More importantly, the type of waste has changed over the years. "Today waste includes paper products, glass, plastics, rubber, metals, leather goods, yard wastes, household chemicals and cleaners, as well as a host of other commercial chemicals and industrial byproducts that are dangerous to human health and the environment."²⁸

RCRA's true focus is on managing generated waste that may be harmful to human health and the environment. There are incentives however, to complying with the national policy of reducing and eliminating such waste. Simply put, the management of hazardous waste is expensive and also requires permits and subjects the generator to fines and penalties for noncompliance. Therefore, if you can do away with the waste stream, you alleviate the need for all of the extra administrative work and potential liability. Our next area of discussion works in a similar fashion.

sources for public and private consumption in order to reduce our dependence on such sources as petroleum products, natural gas, nuclear and hydroelectric generation; and technology exists to produce usable energy from solid waste."

²⁶ Moya, Olga L. and Foya, Andrew L., *Federal Environmental Law, The User's Guide*, p. 89 (West Publishing Company, 1997)

²⁷ *Id* at p. 91. Also citing *The Encyclopedia of the Environment* at p. 792 (Ruth A. Eblen & William R. Eblen, eds., 1994)

²⁸ *Id.*

C. Comprehensive Environmental Response, Compensation, and Liability

Act (CERCLA)

CERCLA²⁹ it can be argued, is yet another incentive for the change in ideology from environmental compliance to pollution prevention. CERCLA focuses on hazardous waste sites that are inactive or abandoned and ranks them based on danger to public health and environment. CERCLA provides a fund to help pay for these cleanups.

The fund must be replenished, however and is done so by those responsible for clean-up actions. CERCLA has tremendous enforceability power. The Act provides for the assessment of liability³⁰ and identifying potentially responsible parties (PRPs). These individuals or entities are responsible for contribution toward the cleanup. An entity may be responsible even though they only leased the property to another that actually caused the harm.³¹ Additionally, that liability may not disappear with the transferring of ownership, a past owner can be held liable even if they in fact, didn't cause the harm.³²

CERCLA is truly a comprehensive Act and the point of discussion here is to identify why the Act may be cause for the motivation of some to change their environmental philosophy. The improper disposal of hazardous waste can be a very expensive venture even years after the property was sold. If you can eliminate waste streams, you eliminate a possible liability issue in the future.

²⁹ Pub.L.No. 96-510, 94 Stat. 2767, amended by Pub.L.No 99-499, 100 Stat. 1613 (1986), Codified at 42 U.S.C.A. §§ 9601-9675

³⁰ See generally 42 U.S.C.A. § 9607

³¹ Id at § 9601 (20) This section discusses the definition of "owner or operator" which are key elements for CERCLA liability.

³² Supra note 30

D. THE CLEAN AIR ACT

The Clean Air Act's primary purpose "is to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population."³³ Congress found that a dangerous amount of pollution was coming from urban areas and crossing state lines. This pollution which resulted from industrialization and use of motor vehicles, resulted in injury to public health as well as to agricultural crops, livestock, damaged property, and created hazards to air and ground transportation.³⁴

This Act also focuses on pollution prevention and delegates to the States the responsibility of reduction or elimination of air pollution at its source or to provide for proper control measures.³⁵ In fact, the Act specifically addresses pollution prevention and states that "a primary goal of this chapter is to encourage or otherwise promote reasonable Federal, State, and local governmental actions, consistent with the provisions of this chapter, for pollution prevention."³⁶

The Act has a myriad of programs and measures designed to control or eliminate pollution of the air. Also, as with RCRA, it requires generators of air pollution to apply for and comply with permits. These sources are also subject to fines and penalties for noncompliance with their permits or for acting without a permit. Therefore, the incentive is once again in place to eliminate pollution at its source by eliminating or changing the process and then avoiding the necessity of permits and other controls. Consequently, the industry can save money by researching and implementing better control methods.

³³ Clean Air Act § 101; 42 U.S.C.A. § 7401

³⁴ Id at (a) (1 & 2)

³⁵ Id at (a) (3)

³⁶ Id at (C)

It is clear through this brief overview of selected legislation; Congress has continually focused on pollution prevention. The incentives are there for industry to create alternative manufacturing or processing methods that would save them money by not having to apply for permits and worry about noncompliance issues. The purpose and directives of these Acts are beneficial to human health and environmental considerations.

The Air Force has made pollution prevention a priority and discovered, as did many other industries, that prevention can be and usually is less expensive than compliance. The goals of the Acts have been incorporated into the management procedures for the Air Force. I will next discuss some of the implementing regulations and policies adopted by the Air Force to further pollution prevention.

2. AIR FORCE REGULATIONS AND POLICIES

Quoting from a PRO-ACT document

"[T]he United States Air Force recognizes the importance of pollution prevention (P2) in protecting the environment, achieving compliance objectives, and reducing waste disposal costs. Successful P2 programs, including recycling, hazardous materials minimization, product substitution, and process changes, among other strategies, are planned or underway at Air Force installations worldwide. The Air Force's environmental programs must do more today than ever before, and do it with increased cost-effectiveness.

The Air Force is a leader in fostering environmental awareness and education within its work force and communities, thereby extending environmental stewardship from a management concept to an individual responsibility. In response to executive orders, regulations, and policies, successful P2 strategies and technologies are continuously being developed, applied, and improved at Air Force bases around the world. As new ways emerge to eliminate compliance burdens, save money, and minimize chemical exposures, the Air Force is committed to collecting these P2 success stories and making them available to Air Force activities everywhere."³⁷

³⁷ PRO-ACT document series *Compliance Assurance & Pollution Prevention Success Stories*, pg 1 www.afcee.brooks.af.mil/pro_act/success internet site visited 15 February 1999. PRO-ACT serves as the Air Force's full-service, environmental information clearinghouse and research center and operates under the direction of the Air Force Center for Environmental Excellence, Environmental Quality Directorate.

The primary regulation that guides Air Force P2 is Air Force Instruction (AFI) 32-7080, titled *Pollution Prevention Program*.³⁸ This Instruction covers a myriad of topics and clearly follows congressional directives calling for the elimination or reduction of hazardous waste. It sets out policies and procedures for obtaining these goals including specific changes in processes. Compliance with the AFI is mandatory for all Air Force personnel. A brief discussion of some of the issues raised in the AFI follows.

The AFI first assigns responsibilities to different command functions that clearly direct the manner in which they are to perform their functions. For example, the Assistant Secretary for Acquisition is to provide policy and guidance to "reduce the use of hazardous materials in all phases of weapon systems from concept through production, deployment and ultimate disposal, find alternative materials/processes, and measure their life cycle costs...reduce the use of hazardous materials in all weapons systems by finding environmentally acceptable alternatives or processes (through research, development, testing, and evaluation) and integrate the alternatives into Air Force Technical Orders, Military Specifications (MILSPEC), and Military Standards (MILSTD)."³⁹

The idea of using weapons that may be more environmentally friendly than current systems may seem strange to some readers since weapons are meant to create destruction. However, to fulfill its military purpose, a weapon does not need to leave damage to the area that is going to create a chemical or other type of danger to human health that will last beyond the immediate destruction. If a weapon can be manufactured to achieve its intended purpose without the use of hazardous chemicals that may contaminate the area for months or years, the new method should be pursued.

³⁸ AFI 32-7080, *Pollution Prevention Program*, prepared by HQ USAF/CEV (12 May 1994). This AFI is currently being updated.

Another example of responsibilities delineated by the AFI is in the logistics arena. The Deputy Chief of Staff of Logistics is to provide guidance and training to “reduce hazardous material use and waste generation at all installations, identify appropriate requirements to the single manager to acquire, distribute, and apply state-of-the-art pollution prevention technologies throughout the logistics community; and ensure the proper receipt, storage, issue, labeling, transportation, and disposition of Air Force-owned hazardous substances.”⁴⁰

The AFI provides for allowing Major Commands or MAJCOMS and Air Force bases the flexibility to manage their P2 programs. This is extremely important in that although there must be one policy and management direction, there also must be the ability to work with regulators and state law at the local level. A diagram of the environmental chain of command would be helpful at this point, please see figure 1 attached.

Several Air Force bases report to each MAJCOM. The challenge is trying to maintain consistency when dealing with so many different State and/or foreign governments and regulations.

The AFI also directs how the P2 program is to be managed. The Air Force asserts that “preventive pollution requires a proactive and dynamic management approach because prevention achieves environmental standards through source reduction rather than “end-of-pipe” treatment.”⁴¹ The program also lists a hierarchy of pollution prevention actions that specifically call for the reduction/elimination of the dependence on hazardous

³⁹ Id at p. 2 paragraph 1. 3.1. 3

⁴⁰ Id at p. 3 paragraph 1. 3. 1. 4

⁴¹ Id at p. 5 paragraph 2.1

materials and waste streams first and foremost.⁴² To facilitate a strong P2 program, this hierarchy must be implemented into standard day-to-day procedures.

The management of the program also calls for the creation of management plans and for opportunity assessments to be performed. Management plans will contain the process necessary to run a successful P2 program, as well as how the projects are to be funded and local responsibilities.⁴³ The plan will contain pollution prevention strategies for specific program elements: ozone depleting chemicals, EPA 17 industrial toxic chemicals, hazardous wastes, municipal solid waste, affirmative procurement of environmentally friendly products, energy conservation and air and water pollution reduction.⁴⁴

Opportunity Assessments consider all pollutant sources and try to identify opportunities to eliminate or reduce waste streams. The assessments are to examine the waste generation by type and volume in order to determine the most economical manner to reduce the waste. The AFI is extremely clear regarding waste elimination via opportunity assessment and states that the installation should "consider waste minimization, including recycling, only if the waste stream cannot be reduced or eliminated."⁴⁵

⁴² Id. The rest of the hierarchy is stated as "reuse generated waste and recycle waste not reusable (recycling), employ treatment; and only as a last resort disposal of wastes (end-to-pipe treatment)

⁴³ Id at p. 5 para. 2.2

⁴⁴ Id. For readers unfamiliar with EPA 17 chemicals, I offer the following: with concern regarding the types and amounts of toxic chemicals being released into the environment, EPA selected 17 toxic chemicals from the Toxic Release Inventory (TRI). As stated in a PRO-ACT fact sheet titled *Product Substitution*, www.afcee.brooks.sf.mil/pro_act/fact, p. 2 (internet site visited 15 February 1999), "the TRI is a list of chemicals established in 1988 by the EPA. Releases of TRI chemicals are reported annually to EPA by industrial facilities under the Emergency Planning and Community Right-to-Know Act or EPCRA (42 U.S.C.A. §§ 11001 - 11-50). These chemicals were seen to have a high potential for reduction through proper pollution prevention controls.

⁴⁵ Id at p.5 para. 2.2.1

The AFI further directs that each installation will have a Qualified Recycling Program, which requires each facility on the installation to collect and segregate recyclable materials for collection.⁴⁶ Each recycling program is required to collect at a minimum, "metals, plastic, glass, used oil, lead acid batteries, tires, copier paper, cardboard and newspaper."⁴⁷ Additionally, each installation is required to operate a composting operation or participate in a regional operation.⁴⁸

This AFI demonstrates the commitment to P2 and waste minimization that the Air Force has put forth. Each installation normally will have their own guidelines and procedures for operating their programs and very few, if any, are just doing the minimum requirements. As you will see by the Whiteman AFB case study the Air Force is far surpassing the requirements. It is important to note that Air Force personnel work and live in these areas with their families and friends. They want the installations and surrounding communities to be environmentally healthy.

Before moving on to discuss how Whiteman AFB, MO developed its program and the success it has achieved, I think it wise to spend a few moments talking about what the EPA defines as a successful P2 program.

3. EPA's Criteria for a Successful Pollution Prevention Program

The EPA's Office of Pollution Prevention and Toxics developed waste minimization program elements it determined are necessary for successful P2. The elements were

⁴⁶ Id at p. 10 para. 3.4.1 and 3.4.1.2

⁴⁷ Id at p. 10 para 3.4.1.2.1

⁴⁸ Id at p. 11 para 3.4.1.2.2

published in the Federal Register and can also be found on their internet site.⁴⁹ The program elements are identified as:

1) Top Management Support - ensuring P2 becomes an organizational goal.

Methods of demonstrating support can be demonstrated by creating a written company policy, rewarding P2 innovators and providing training.

2) Characterization of waste generation & waste management cost - determine the amounts and types of wastes and the actual costs associated with management and cleanup.

3) Periodic waste management assessments - to identify any P2 opportunities.

4) Cost allocation system - simply put, charge actual costs to the department or division that is actually generating the waste. This element also would create an incentive to the department to conduct waste management assessments and eliminate waste.

5) Encourage technology transfer - Review technical studies and reports as well as successful case studies to identify methods or procedures that may apply to your industry or facility.

6) Program review - Check to see if the program is working and where it can be improved. Get feedback from your employees. Identify whether or not your organization has adopted P2 as a business practice.⁵⁰

Comparing these program elements to AFI 32-7080 discussed above, it is clear that the Air Force has implemented these program criteria in its P2 program. This fact will

⁴⁹ 58 FR 102, pgs 31116 - 31117 (May 28, 1993) and the internet site www.epa.gov/oootintr/p2home/p2setup (internet site visited September 14, 1998)

⁵⁰ Id

also be evident in our discussion of Whiteman AFB's P2 program and its comparison to EPA's model.

III. Brief Background on Whiteman Air Force Base, Missouri

Whiteman AFB is in a very rural part of central Missouri. It is surrounded by trees, rolling hills and farms. The base is located about 60 miles southeast of Kansas City and just 2 miles south of a little town known as Knob Noster. The cities of Warrensburg (10 miles west) and Sedalia (20 miles east and also home to the State fair) are the closest places for shopping and entertainment. The area is peaceful with a very low crime rate--, as many have said, a nice place to raise a family.

Whiteman AFB is quite impressive as it sits among these farmlands. It is home to the most advanced tactical weapon system to date: the B-2 bomber. More than 10,000 military members, Department of Defense civilians and Air Force family members live and work on the installation.⁵¹

The base is home to the 509th Bomb Wing, which also has a proud and interesting history.⁵² The base was first established in 1942 and named the Sedalia Army Air Field. Its primary mission was to train Waco glider pilots, some of whom saw action in World War II, including the invasion of Sicily in July 1943 and the D-Day invasion of Normandy on June 6, 1944.⁵³ In 1947, the base was inactivated only to be opened again

⁵¹ Whiteman AFB Public Affairs Office, *Whiteman Air Force Base... past, present, and future*, p. 1, (internet site visited 20 March 1999) <www.whiteman.af.mil/baseinfo>

⁵² The 509th is the bomb wing that dropped the atomic bomb on Hiroshima and Nagasaki. The Wing was also the host Wing at Roswell, New Mexico during the famed alleged crash of an alien spaceship where many still assert the government has concealed the alien bodies.

⁵³ *Supra* note 47 at p.1

in 1951 under the Strategic Air Command supporting the B-47 bomber, and the three aerial refueling tankers: the KC-97 and later the KC-135 and KC-10.⁵⁴

The base had its name changed to Whiteman in October of 1955. The name was changed to honor a Sedalia native, Second Lieutenant George A. Whiteman, who was killed when he attempted to take off during the attack on Pearl Harbor on December 7, 1941.⁵⁵

In 1961, Whiteman's mission changed from a flying wing to a missile wing and the 351st Strategic Missile Wing was activated in February 1962. The base was responsible for Minuteman Inter-Continental Ballistic Missiles and a massive construction project was necessary to accommodate the new mission.⁵⁶

On January 5, 1987, it was announced that Whiteman's mission would once again change and flying duties would return to the Wing as the sole host of the B-2 bomber. On September 30, 1990, the 509th bomb Wing arrived at Whiteman and prepared for the arrival of the first B-2 bomber on December 17, 1993.⁵⁷ The base also is host to two tenant organizations, the 442nd Fighter Wing, which is an Air Force Reserve Unit flying

⁵⁴ Id

⁵⁵ Id. Another document titled *A Brief History of Whiteman AFB, MO* found at the same internet site as supra note 47 states "during the attack of Bellows Air Field, Oahu, Lieutenant Whiteman managed to reach his fighter aircraft. While attempting to take off, enemy fighters attacked his plane. Sadly, Lieutenant Whiteman's P-40 crashed, fatally injuring the mid-Missouri native. By the time rescue teams reached the aircraft, Whiteman had died." Whiteman was one of the first American airmen killed in combat during World War II.

⁵⁶ Id. As an example, the contract called for construction of hardened, underground launch facilities and 15 launch control facilities (only one is left and it is the only one ever to be sited directly on an Air Force installation. OSCAR 1 is now a museum on Whiteman AFB and allows individuals to ride an elevator down and enter the launch control area). "The project called for the excavation of 867,000 cubic yards of earth and rock and contractors used 168,000 yards of concrete, 25,355 tons of reinforcing steel and 15,120 tons of structural steel. In addition, the project called for the installation of a vast underground intersite cable network and if this cable were laid end to end, it would stretch from Whiteman to 100 miles beyond Los Angeles." The launch control facilities were spread out over central and western Missouri and connected for communications and other actions by the cable. The entire project was completed in just two years, a near impossible feat under today's environmental requirements.

⁵⁷ Supra note 51 at p. 2

the A-10 aircraft and the Missouri Army National Guard, 1st Battalion, 135th Aviation, flying Cobra helicopters.

Like the aircraft that it supports, the Whiteman community is also out in the forefront when it comes to P2 and environmental issues. The 509th Civil Engineering Squadron's Environmental Flight manages the proactive and successful program.

IV. Whiteman AFB Environmental Case Study

Mr. Kendall Nugent leads the 509th Environmental Flight, which consists of 20 individuals. The flight handles all environmental issues and programs including: conservation, compliance, restoration and pollution prevention. In the early 1990's, the Air Force and Air Combat Command placed stringent waste reduction goals on individual Air Force bases. The Environmental Flight used its combined experience and "took a holistic look at the base industrial processes, developed efficient and effective solutions, and are now applying them at a central facility."⁵⁸ The holistic view has resulted in brilliant programs and allowed for members of the flight to use their initiative and continually create new P2 methods. The central facility mentioned above and by far the most successful new P2 method developed is known as "P2 Central."

The P2 Central facility is housed in a 2400 square foot building with another 800 square foot mezzanine for storing items. In its relatively short life cycle, P2 Central has proven itself over and over again. Whiteman has reduced its hazardous waste dramatically--from approximately 140 tons in 1990 to 16 tons in 1998.⁵⁹ Even more

⁵⁸ Whiteman AFB's nomination package for the *Renew America - 1999 National Award for Sustainability*, p. 1, prepared by the Whiteman AFB Environmental Flight.

⁵⁹ Whiteman AFB's nomination package for the *State of Missouri's Pollution Prevention Award 1998*, p.1

impressive is the fact that Whiteman is striving for Small Quantity Generator⁶⁰ status and is on a positive track to obtain this goal.

Mr Nugent and his staff report that "the charter for P2 Central is fairly straight forward; across the base numerous shops were duplicating industrial operations. Each shop handling identical wastes and justifying what they were doing based on their own relatively small quantities. A few examples of this type of duplication are recycling operations for canister oil filters, multiple corrosion painting operations, various generators of petroleum soaked absorbent matting or booms, and numerous generators of used oil. We knew consolidating the recycling and processing portion of these common practices would help us reach our waste reduction goals. An added benefit comes from increasing processing efficiency, decreasing operating costs, releasing man-hours spent on pollution prevention back to the shops, and presenting the base with a showcase facility to display P2 activities."⁶¹

The concept is relatively simple and easy to follow. Several organizations are doing the same tasks, consolidate the tasks into the hands of professionals helping to avoid accidents and mistakes while saving time and money. This is a perfect example of what can happen when you allow the "hands-on experts" to study the problem and design a solution. This solution is a grand success.

The individuals who used to work their separate programs hail the P2 concept. Most of them were conducting environmental tasks, such as maintaining hazardous waste logs required under RCRA, as an extra duty. With constant turnover in the shops because military members transfer frequently to other duties and other installations, it was difficult to maintain the required training and continuity necessary for a healthy program. Now the shop personnel are not alone in their programs and no longer have to do the majority of the paperwork (they still must maintain the logs at their site).

The P2 experts do 95 percent of the tasks involved. They perform "opportunity assessments, sorting of waste, characterization, pick up, recycling, and distribution of

⁶⁰ To obtain this status, a facility must produce less than 1,000 Kg. of waste per month. Such a status has significant impact on the way a facility manages its environmental programs and the associated costs.

⁶¹ Supra note 58 at p. 1

reprocessed materials.”⁶² The opportunity audits conducted by this single entity have allowed for a better view of the entire base operation. The audits helped to identify several waste streams that could be eliminated and problem areas where spent waste streams could enter the environment. For example, the waste stream with the largest potential for entering the environment was a spent or spilled petroleum product. P2 has taken care of this problem by collecting all absorbent material for recycling “and have virtually eliminated disposal of all spent oils and oil contaminated material. In FY 1998 alone, P2 Central recycled over 8000 gallons of used oil.”⁶³

Whiteman has experienced other tangible benefits from the P2 initiatives.

A. **Cost savings** - A finally tally of all cost savings has not been computed as of yet. However, there are clear examples of savings in many areas. The first and most obvious is the elimination of duplicative processes. As the base points out in its 1999 Renew America Award nomination: “[A] prime example was the replacement of five machines into one. This machine self sufficiently performs the cutting of canister type oil fuel filters, compressing the element to reclaim the oils, and compacting the steel for recycling (a very time intensive operation for five people). The operation is performed by a single individual who collects the filters, then dumps one barrel at a time into the top of the machine and pushes a button.”⁶⁴ A single team is now doing what several different teams were doing, allowing the latter teams to concentrate more on their primary duties and not devote hours to environmental tasks.

Other costs savings are recognized by the elimination of waste streams. As an example, the waste oil discussed above is now used to heat several facilities on the

⁶² Id at p. 1

⁶³ Id at p. 2

⁶⁴ Id at p. 2 and 3

installation. This process reduces energy costs and avoided disposal costs of 13,000 gallons of spent oil.⁶⁵ The utilization of oil/water separators has eliminated 101,000 pounds of hazardous waste, saving more than \$60,000 annually.⁶⁶ The recycling of solvents, barrels, anti-freeze and oil absorption material has also created considerable savings -- including not having to pay for disposal or new products. These processes will be discussed in specifics later in the paper.

Whiteman also has created recycling programs for household materials and garden waste that help create revenue and avoid paying tipping fees to local landfills.

B. More control of waste procedures - A major benefit of the P2 program is that environmental professionals are responsible for the program. This method helps to greatly reduce errors in processing waste and maintaining the required paperwork. Under the old system, numerous individuals were trying to maintain their own programs and there was ample room for mistakes. These simple mistakes sometimes resulted in a Notice of Violation (NOV) being issued from the Missouri Department of Natural Resources. P2 allows for control of the waste stream and paperwork. The P2 staff does everything from sorting and characterizing the waste, to completing the necessary paperwork. The system also allows the P2 staff to continually identify better procedures through daily exposure with the process and continued opportunity assessments.

C. Regulator/State Response - Working with the State regulators is an important element of a successful environmental program. Whiteman held a "Regulator Day" and invited a myriad of regulators to visit the base and see its programs. According to many members of the Flight, the regulators came and toured the installation and were

⁶⁵ Id at p. 2

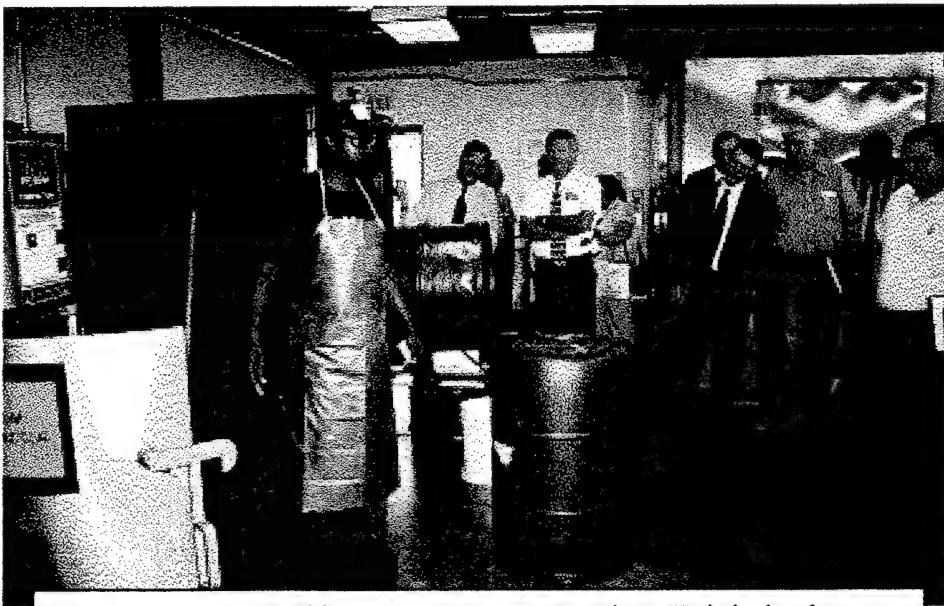
⁶⁶ Id

truly impressed by the P2 program and P2 Central (among other environmental programs on the base).

The regulators left the base with a solid understanding of Whiteman's environmental programs. They also witnessed the efforts and dedication made by the base personnel towards ensuring a healthy and productive environment. Many remarked that this was the most comprehensive and successful program they had seen.

What does this do? It lets the regulators see for themselves, in an amicable atmosphere, that Whiteman is a steward of the environment and not an entity that needs to be constantly watched.

These are just a few of the advantages that the program offers. How and why is the program so successful? A closer look at the actual methodology and equipment will help to explain.



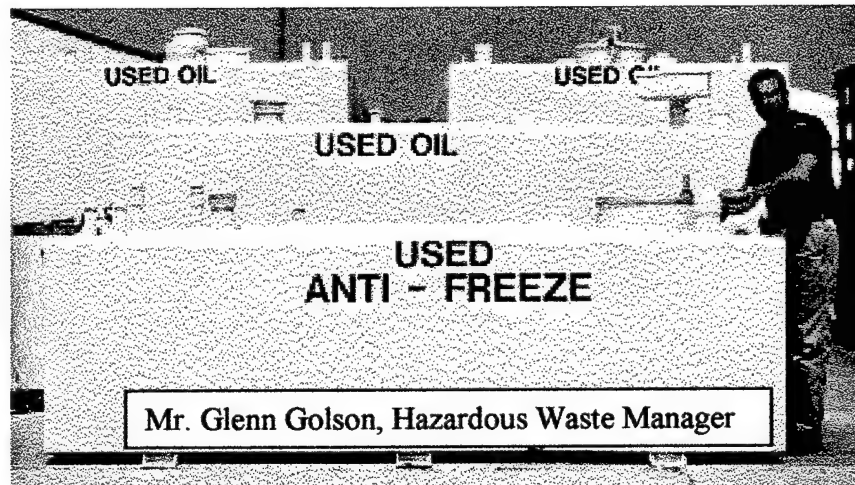
Regulator Day at Whiteman AFB -- Mr. Ted McKnight leads tour of P2 Central

1. Whiteman's P2 Central

Whiteman uses several methods and equipment to reduce pollution. These include P2 Central and the recycling and composting programs that reduce solid waste.

a. Oil Recovery & Heating & Anti-freeze recycling- The Used Oil Center collects all spent petroleum, oil, and lubricant products generated on base and distributes to locations on base which have used oil furnaces for heat reclamation. Presently, hard to heat high bay shops (work centers that have extremely high ceilings and are somewhat cavernous), the RRRP Center and the Auto Hobby Shop are heated with used oil.⁶⁷ Whiteman produces an average of 8,500 gallons of used oil every year from vehicle and aircraft maintenance.⁶⁸

This is a significant program since Whiteman has virtually eliminated this waste stream and associated disposal costs while also reducing energy costs by using the oil to heat buildings that would be very costly to heat. The program is inexpensive to run and energy savings average \$13,000 annually.⁶⁹



Antifreeze can present a significant waste stream. Whiteman generates approximately 2000 gallons of used Antifreeze a year.⁷⁰ P2 Central has taken this burden from the

⁶⁷ 1998 P2 Narrative Briefing, item 3. Prepared by the 509th Civil Engineering Environmental Flight. This document is used for giving tours of P2 Central. Copy on file with author Copy on file with author.

⁶⁸ Id

individual work centers and brought it under one roof. The Antifreeze is properly reclaimed and filtered. The "new" material that is sent back to the work centers meets its original specifications, but only costs \$1.50 per gallon compared to \$4.50 a gallon.⁷¹

b. **Centrifuge:** This machine is yet another way to recover used oil while also eliminating a second waste stream. For example, suppose an oil or fuel spill occurs, it can be a few gallons or several hundred gallons. The quickest way to collect the spill is by using absorbent mats, booms and pillows.⁷²



These materials are then taken to the centrifuge, which has a 30" tub and can hold up to 100 pounds of material.⁷³ The centrifuge simply spins the fluids from the matting and the fluids are collected. The centrifuge does such a thorough job that most mats that were involved with small spills or shop clean-ups are returned to the shops to be used again. If the material cannot be reused it is disposed of as special waste, not

⁶⁹ 1997 P2 Briefing prepared by 509th Civil Engineering Flight and from the 1998 Natural Resources and Environmental Awareness display boards created by the Flight. This does not include administrative costs. Copies with author.

⁷⁰ Supra note 67

⁷¹ Id

⁷² Absorbent mats are simply material that is placed on the spill and is designed to absorb oil and fuel quickly. A boom is used in water usually. The boom looks like a cigar is tied to other booms and either surrounds the spill (in a lake) or is placed across a stream, river or creek. It collects the fuel or oil as it floats down river. A pillow is a smaller boom and has the same function.

⁷³ Supra note 69

hazardous waste.⁷⁴ Once again, another waste stream is eliminated.

The used oil that is recovered is tested and then sent to the used oil program where it is used to heat buildings. During 1997, 626 gallons of used oil was recovered.⁷⁵

Another major advantage of having this system is that if you have a spill in water, you can quickly determine how much of the spill you are collecting. You can keep accurate counts of the gallons collected and report this to the State regulators. The system also lets you know how dogmatic you still must be in order to collect the spill. A case I am familiar with where I actually helped place booms in a stream, collected virtually every bit of the spill that was caused by a contractor.

c. **Aerosol Can Recycling** - This program is an excellent example of Whiteman's commitment to P2. Aerosol cans may not appear to be a major source of concern at first blush; however, between January and September of 1997 alone, 810 pounds of aerosol cans were recycled by P2 Central.⁷⁶

The process is relatively simple. The cans are collected and those that still have sufficient material in them are reissued to other customers on the base. In FY 98, the process "returned 10 drums worth of usable and recycled solvent back to the users."⁷⁷



⁷⁴ Id

⁷⁵ Id

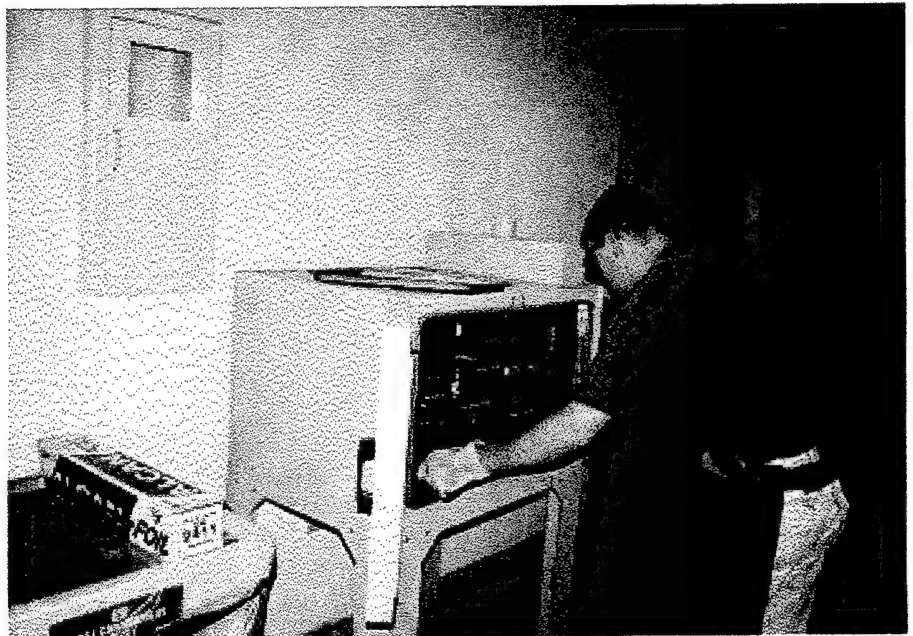
⁷⁶ Id

The machine you see pictured here then handles cans that are empty or do not have enough material to reissue. The machine punches a hole into the can and recovers its contents. The contents are characterized and then disposed. The can is recycled as scrap metal.

The result is that another waste stream is reduced in that the can is no longer part of the waste stream. In fact, the can is now a revenue generator by being recycled as scrap metal.

d. Paint Oven - Like many large organizations, Whiteman does a lot of painting of its facilities and equipment. Like the aerosol cans, paint that can be reissued is sent back to other base units for use. However, if the paint cannot be used how do you reduce the waste stream since liquids can't go into a landfill?

Whiteman's solution was to change the paint's physical state from a liquid to a solid that then could be sent to a landfill.⁷⁸ The paint oven accomplishes this act. The paint is poured into pans and then dried in the oven and the material or "cake" then can be discarded as a non-RCRA waste.⁷⁹ This simple procedure eliminates



⁷⁷ Supra note 58 at p. 6

⁷⁸ Id. and Natural Resources and Environmental Awareness Display Boards

⁷⁹ Supra note 69

yet another hazardous waste stream and is extremely inexpensive to perform. The cost of the machine was only \$500.00.

e. **Drum Washer** - Environmental managers from any industrial facility will tell you that a major problem they continually face is how to properly manage the constant flow of 55-gallon drums. Unfortunately, many of them end up outside in an out of the way place where they collect rain water and rust.

P2 Central has just the piece of equipment to put old or used drums back into service. The drum washer costs \$20,000 and uses a mixture of old fashioned technology with new methods. The drum is placed into the machine and triple rinsed with a solution of hot water and soap (Simple Green).⁸⁰ The drum is then stored inside and reissued to another customer saving valuable dollars by not having to purchase another drum. An average of 10 drums a month are returned to the users and in FY 98, they have run 552 drums through the washer and returned them to the users.⁸¹ The rinse water is part of the new technology and is processed through a filter system and reused.⁸²

f. **Drum Crusher** - The crusher is the second part of proper drum management on the installation. If the drum is no longer serviceable, it immediately goes to the crusher. At a cost of \$8,000, the crusher is a wise investment. The crusher works like a trash compactor. It pushes the drum into a compact piece of metal that can be recycled as scrap metal, a good source of revenue.

⁸⁰ Id

⁸¹ Supra note 67 at p. 1. Also see supra note 58 at p. 6, (1999 Sustainability Awards nomination)

⁸² Id

There is a need for this process. Between January and September 1997, 309 55-gallon drums and 175 five-gallon drums were recycled. In FY 98, 5,400 pounds of non-compliance drums were recycled.⁸³ This significantly reduces storage problems, avoids the costs of having to hiring a contractor to remove the drums and provides the opportunity to create revenue.

g. Solvent Recovery - This is probably the most physically dangerous P2 initiative undertaken by Whiteman. The solvent reclaimers (each free from the Azores, normal costs \$12,500 each) are housed in a specially constructed explosion-proof room. Solvents can be somewhat volatile and these safety precautions are meant to contain any accident.⁸⁴

About 10 drums of used solvent are processed through the P2 facility every year. The solvent reclaimers distill the material and produce a product that is superior to Safety Kleen and goes right back to the organizations for reuse.⁸⁵ As of September 1997, 130 gallons have been processed.⁸⁶ The process is a true success story. Not only does it eliminate a waste stream, but it also provides the customer with a cheaper, yet superior product than they can get on the market. Customers have been extremely satisfied with the performance of the recycled solvent and it can be recycled several times. The objective is to eventually get rid of all Safety Kleen tanks on the installation and the process is working; in FY 98, "P2 Central reached a 90 percent reduction in waste steams from FY 97."⁸⁷

⁸³ Supra note 58 at p. 6

⁸⁴ Supra note 67 at p. 1

⁸⁵ Id.

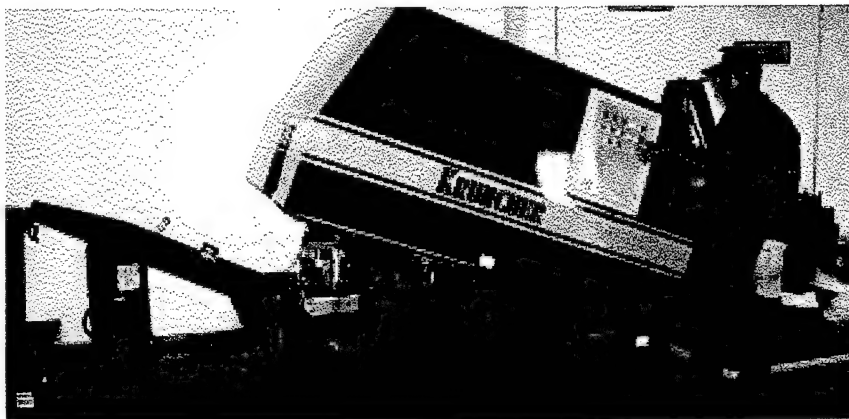
⁸⁶ Supra note 69

⁸⁷ Supra note 58

h. Hot Water Parts Washers - A simple and inexpensive way to reduce the use of solvents on the installation and aid in eliminating the dependency on Safety Kleen. Hot water washers are safer for not only the environment, but also for the individual who is cleaning the parts--no solvents.

The base has 12 parts washers that aid in the elimination of the solvent waste stream. The cost is \$6,000 for a refrigerator-sized washer. The small amount of sludge they produce is tested and disposed of properly.

i. The Kruncher - This machine, without a doubt, saves time and worker hours. This is the machine alluded to in the introduction to P2 above. The Kruncher can handle several oil filters at once, extracting the oil and "krunching" the remaining filter. In the past, Whiteman had several shops performing oil filter recycling by basically dealing with contractors. When P2 Central was started, oil filters were centralized but the filter processing was very labor intensive. The Kruncher alleviated the problems and made this P2 initiative a simple task.



The procedure is pretty straightforward. The operator drops the filters or aluminum cans into the machine and presses a button. The machine extracts oil from the filter,

which is recycled. In approximately two minutes, the machine produces a small, extremely compacted block of steel.⁸⁸ A 7.5-pound compacted cube is created from 15 to 20 filters.⁸⁹ The compacted steel commands a higher price when sold to a recycler. Between Jan 97 and Sept 97, 2735 oil filters were recovered and sent for scrap metal recycling.⁹⁰ In FY 98, 2,385 pounds of scrap and 775 gallons of oil were recovered.⁹¹ What was once a waste stream, is now a revenue generator.

j. Trailer Mounted Oil/Water Separator - At a cost of approximately \$48,000, this machine paid for itself over a two-day period with just one project. Whiteman had received a bid of \$100,000 from a contractor to dispose of 150,000 gallons of water from an underground storage tank project. Once they purchased this machine, they did not pursue the contract bid, but did it themselves.⁹² This one project took two days to complete and saved and estimated \$100,000.

The unit can filter 60 gallons of water per minute. It is an excellent tool for spill clean up and will have a major impact on stationary oil/water separators and hot water parts washers.⁹³ The equipment gives the base the technology that allows a two man team "to clean the oil water separators on an accelerated schedule and ensures that the contaminants stay below RCRA limits. This initiative alone accounted for the elimination of 101,000 pounds of hazardous waste annually...[I]ncreased focus on such

⁸⁸ Id

⁸⁹ Supra note 67

⁹⁰ Supra note 69

⁹¹ Supra note 58

⁹² Supra note 69

⁹³ Id

waste generation devices by P2 personnel has clearly minimized Whiteman's impact to State waters and helped establish a healthier work environment."⁹⁴

k. Other P2 Central Operations - Whiteman has a few other projects that take place in P2 Central. For example, they are a centralized collection point for fluorescent bulb recycling. The State of Missouri has determined that if a generator sends these bulbs to a recycling facility in the State, no manifest is required.

This was an interesting dilemma because for a long period of time, no fluorescent bulb recycling facilities existed in the State of Missouri and organizations did not want to store the lights because of RCRA. Many still had to manifest because the bulbs went across State lines. Whiteman is buying replacement bulbs with less mercury, which is more environmentally friendly.

Small battery collection was a hit with the Missouri Regulators. P2 Central collects a myriad of batteries from the work centers on the installation and arranges for proper disposal.

P2 Central Conclusion

Taking a holistic view has made a strong and positive impact on pollution prevention at Whiteman AFB. Eliminating the duplication of functions, saving hundreds of worker hours, cleaning materials for reuse, reducing energy costs and generating revenue are all outcomes from the program.

To better assess the actual costs savings; the author contacted Mr Jim Brockmeier, Chief of the Pollution Prevention Element for the 509th Civil Engineering Squadron on Whiteman AFB. Mr Brockmeier provided the following response:

⁹⁴ Supra note 58 at p. 5

"The answers you want are not readily available at this time, but I'll try. Costs are particularly hard to arrive at. If you consider cost avoidance in handling P2 Central's materials as special or hazardous waste the number of dollars avoided is probably between 100K to 150K a year. However, there are many other aspects of our operation which are not easy to tie into the overall costs. P2 Central "CENTRALIZES" multiple P2 operations... we have more expensive equipment but it performs the tasks faster, better, and with less personnel. The "Kruncher" we use to handle canister oil filters was expensive (30K?) but it replaces five units, each of which cost 5K, operated in a different base shop, manned by different personnel, each generated special wastes and left a mess to handle and a legal liability to cover. The Kruncher operates with the push of one finger and generates no mess or liability. Since we don't really have a handle on how much manpower P2 Central has released for the rest of the base in all our processes it is hard to develop a cost saving. Also our operations are somewhat open to contractors (and have replaced contractors), eg. if the contractor will generate barrels we take them (less mess and liability and a little revenue for RRRP). The portable wastewater treatment plant operated by P2 Central was activated to replace contractor disposal of several hundred thousand gallons of POL contaminated ground water, making it possible for us to dispose of the water in our own sanitary - this operation saved the base \$101K (More than twice what the portable treatment plant cost).

The goal P2 Central still holds on to is to make environmental protection an ethic for all at Whiteman AFB. I believe to a large extent we have achieved this. P2 Central is about a lot more than \$\$, it truly is about spreading an attitude of caring about the environment. We believe the end result of the dollars we have saved is probably insignificant compared to the cumulative result of hundreds of others following and spreading our caring example. As far as a future goal, we have never placed a number of pounds or dollars to reach on our operation. An overriding goal (which was one reason we started P2 Central) was too positively lower our generation of hazardous waste (hence our liability). We have done remarkably well in this venture and have dropped from 140 tons in 1990 to an expected 10 to 12 tons this CY. In the future we are planning to treat some of our hazardous waste streams at P2 Central, as allowed by 40 CFR 268.7, rendering them environmentally safer.

I know this is not exactly the response you were hoping for, but numbers are hard to provide when your initial charter was "make P2 work, make it easy and make it spread".⁹⁵

Mr Brockmeier provides an excellent explanation of the program while demonstrating the difficulty of quantifying the total costs savings for the program. The reader should

⁹⁵ James Brockmeier, E-Mail message (19 April, 1999) Copy on file with author

also note the sense of purpose in Mr Brockmeier's words, "P2 Central is about a lot more than \$s, it truly is about spreading an attitude of caring about the environment. We believe the end result of the dollars we have saved is probably insignificant compared to the cumulative result of hundreds of others following and spreading our caring example."⁹⁶

This sense of duty permeates from the holistic view and the ability of the engineers, with management support, to try innovative ideas to accomplish the P2 mission. Thus far the amount of money that has been spent on the equipment is:

Solvent Distiller	\$12,500
Distiller Enclosure	\$23,690
Paint Oven	\$500
Aerosol Processing	\$500
Drum Washer	\$20,000
Drum Crusher	\$8,000
Centrifuge	\$30,000
Kruncher	\$41,500
Oil Water Separator	\$48,000
Total	\$192,690 ⁹⁷

The costs for P2 Central is extremely reasonable and affordable when you look at the positive impacts the facility has had and mentioned above. Just the elimination for the

⁹⁶ Id

⁹⁷ Supra note 69

need for contractors and contract administration is a huge cost savings. The example of the water that needed to be removed from the underground storage tank area is a clear argument for the success of the program. Furthermore, a tremendous amount of materials are removed or "diverted" from disposal as the P2 Pollution Prevention chart shows. (See Figure 2). In 1998, Whiteman's P2 program diverted 95,819 pounds of material from landfills or hazardous waste streams.

However, P2 Central is not the only significant P2 initiative on Whiteman AFB. The base also has a strong solid waste recycling program as well as a composting program.

2. The Resource, Recovery, & Recycling Program (RRRP)

a. Solid Waste Recycling

Whiteman has a very proactive RRRP. The program includes curbside recycling in all residential areas and material collection in offices, restaurants and the short and long term temporary housing facilities. A brief pictorial overview with explanations of the program at Whiteman can be found attached as figure 3.⁹⁸

The FY 98 goal was to increase the tonnage recycled by four percent.⁹⁹ The program has some other tangible goals. For example, the FY 98 goal for revenue generated from recyclable material was \$85,000 and by June, a total of \$32,700 had already been realized.¹⁰⁰ The projection was to raise more than 60,000 by the end of the fiscal year. This was based on lower market rates for the material than the previous year.

⁹⁸ Supra note 69 (Environmental display boards)

⁹⁹ Steve Brockman, RRRP Quarterly Update Briefing, Whiteman Environmental Flight. (July 1998). Copy in files.

¹⁰⁰ Id

An example of the impact market rates may have can be seen by comparing the 1st quarter FY98 to 1st quarter of FY99 cardboard revenues. In the 1st quarter of FY98, the base generated \$10,430 for cardboard at \$80 per ton. The 1st quarter of FY99 only generated \$4,285 because cardboard had dropped to only \$25 per ton. This is a 70 percent decrease for this commodity.¹⁰¹

The amount of materials recycled was another goal for FY 98 and the target was 1,650 tons. By the end of the third quarter, 890 tons had been recycled with an end of year projection of 1,550 tons.¹⁰² A comparison between FY98's 1st quarter numbers (262 tons) and FY99's (353 tons), shows a 26 percent increase for processed materials.¹⁰³

A significant statistic in Mr Brockman's briefing is the amount of waste diverted. The FY 92 baseline was 850 tons of solid waste disposed. By the third quarter of 1998, the amount was approximately 200 tons--a dramatic 68 percent reduction. The FY98 disposal cost avoidance amounted to \$135,740.¹⁰⁴ The holistic philosophy of the base regarding P2 will surely bring this number of tons disposed even lower and the amount of disposal costs avoidance higher.

b. Composting Program

A pictorial explanation of this process can be found as figure 4 at the end of this document. The program is extremely successful and produces top quality compost. The RRRP personnel conduct curbside green waste pick-up once a week in residential areas. All other green waste that is collected from lawn care around non-residential areas is delivered to a common location for transport to the composting area.

¹⁰¹ Steve Brockman, RRRP Quarterly Update, Whiteman Environmental Flight (Jan 1999). Copy in files

¹⁰² Supra note 99

¹⁰³ Supra note 101

¹⁰⁴ Id

The key to the process is the in-vessel composting system. This machine, which resembles the back of a cement truck, is computer operated. It turns the material at the precise time and keeps the material heated to allow faster microbial activity. The entire process takes 72 hours and produces superior compost.¹⁰⁵ The compost is used throughout the installation and housing residents can take as much as they need, free of charge, to improve their soil. The operation has eliminated a waste stream and diverted a natural process from going into lawn bags and buried in landfills.

3. Actual impact on operations

The P2 program at Whiteman tremendously affects everyday and long-term operations. The cost savings are very apparent. The Environmental Flight has devised a program that virtually does away with the costs of contractors and the need to buy large amounts of virgin materials. The flight's initiatives reduce energy costs, produce recycled products that go back to the organizations for re-use, centralizes the processes allowing for less worker hours per organization to be devoted to P2, decreases the opportunity for notices of violations by having the experts handle the materials and the paperwork, and saves hundreds of thousands of dollars diverting the material. They are without question solid stewards of the environment.

The cost savings benefit countless other activities for the installation. For example, savings have allowed the Base to purchase better P2 technology, stock the base lake with an assortment of fish for those who like to fish, purchased new picnic tables for the base park and enabled the construction of a new bathroom facility near the softball fields.¹⁰⁶

¹⁰⁵ Supra note 69

¹⁰⁶ RRRP Housing Residence Guide, Making it Easy--Curbside, (1996). Copy on file.

A notable operational impact of the success of the program has been the response by the State of Missouri regulators. The intensity in which Whiteman has tackled P2 issues has strengthened the relationship between the base and the regulators. The regulators have also seen success through the entire environmental program. During 1998, the base had 12 State inspections without a violation.¹⁰⁷ These results get circulated through the Department of Natural Resources and the fact that Whiteman has a strong environmental program and is leading the way is not only known by the regulators, but also appreciated. However, the State of Missouri regulators aren't the only ones impressed by the program.

Whiteman also participates in a DoD Environmental Roundtable. Members from the Army, Air National Guard, Air Force Reserves and the Corps of Engineers all toured the facility. The author heard the laudatory comments and the questions arising how to implement the program on their installations.

4. How Does Whiteman's Program Compare with the EPA's waste minimization? program elements it determined are necessary for successful P2

The program elements are identified as:

1) Top Management Support - ensuring P2 becomes an organizational goal.

Methods of demonstrating support can be demonstrated by creating a written company policy, rewarding P2 innovators and providing training.

Whiteman's program meets this element. Having first hand knowledge of management's support, the author can attest to their enthusiasm for the program. Management had concrete evidence demonstrated by actual cost savings and reduction of waste streams at the programs infancy. These results created the opportunities for the

¹⁰⁷ 1998 Curtin Award Squadron Briefing, Environmental Flight. Copy on file. The 12 inspections were: 6 asbestos, 1 EPCRA, 1 Air, 1 Above Ground Storage Tanks (AST), 1 RCRA, 1 Wastewater and 1 Drinking water.

Environmental Flight to continue improving its program. Additionally, Flight members received money for training courses to further enhance their skills.

2) Characterization of waste generation & waste management cost - determine the amounts and types of wastes and the actual costs associated with management and cleanup.

This element was a catalyst for some of the P2 innovations. The Flight calculated the wastes and costs that were incurred by having contractor's dispose of the waste and multiple organizations performing the same tasks. They had to submit costs analysis in order to justify buying new equipment and implementing new procedures.

3) Periodic waste management assessments - to identify any P2 opportunities. These assessments are done by P2 members and have been successful as the growth of the program and elimination of waste streams proves.

4) Cost allocation system - simply put, charge actual costs to the department or division that is actually generating the waste. This element also would create an incentive to the department to conduct waste management assessments and eliminate waste.

Whiteman took a different approach than charging the actual departments. Whiteman took a holistic approach that brought everyone under one roof to ascertain how the departments could help each other and all benefit. The result is the same as intended by the EPA, organizations take responsibility for reducing waste.

5) Encourage technology transfer - Review technical studies and reports as well as successful case studies to identify methods or procedures that may apply to your industry or facility.

Continually researching for new methods or procedures is why P2 Central is so successful. The Flight members strive to make the system more efficient daily. They review successful case studies that the Air Force and civilian information systems distribute. The Flight also contributes articles and case studies to these information sources.

6) Program review - Check to see if the program is working and where it can be improved. Get feedback from your employees. Identify whether or not your organization has adopted P2 as a business practice.

The Environmental Flight conducts a quarterly review of its programs and must also prepare reports for higher headquarters. These reviews can also be seen through some of the award nomination packages that have been cited in this paper.

Conclusion:

Whiteman's program does meet the EPA elements for a successful P2 program. In fact, it only deviates in one area by not charging divisions for the waste generated. Instead, Whiteman's holistic view seeks to improve the program and costs for the entire Base and does not single out individual work centers for costs.

V. SALT LAKE CITY AND COUNTY'S P2 PROGRAMS

Salt Lake City is a picturesque environment with many outdoor activities. It is situated in a valley surrounded by the Wasatch and Oquirra Mountains. The Great Salt Lake sits just to the west of the city.

Salt Lake County has a population of approximately 1,908,000¹⁰⁸ and encompasses approximately 756 square miles.¹⁰⁹ The largest city in the State of Utah, and therefore in the County, is Salt Lake City with a population of 172, 178 (1996 numbers) and covers only 90.5 square miles.¹¹⁰

1. ENVIRONMENTAL PROGRAM MANAGEMENT

A. The City

Mr. Christopher Bleak handles environmental issues for the mayor's office. In response to an e-mail message with a list of questions, he sent the following:

"Salt Lake City does not have a "registered" P2 program. In the words of our environmental advisor at the airport--we do have a number of pollution prevention programs that are dictated by permits, etc., but there is nothing that specifically falls under this P2 title. Most of these fall under the various state regulations that are set by federal ones."¹¹¹

Mr Bleak reports that the City does encourage pollution prevention and that they are involved with a number of programs, including curbside recycling and recycling within city buildings.¹¹² Additionally, the City is involved with the Clean Cities program "which promotes the use of alternative fuels in automobiles."¹¹³ Mr Bleak states that the City is proud of the airports' use of alternative fuels and the airport was recently

¹⁰⁸ National Populations, www.sta.cathedral.org/lowerschool/chronical/Issue03/states.ut (Internet site visited 18 April, 1999)

¹⁰⁹ Salt Lake Chamber of Commerce Internet Site, www.slachamber.com/saltlake/demographics (internet site visited 19 April, 1999)

¹¹⁰ Id

¹¹¹ Christopher Bleak, Environmental contact for the Mayors office, Electronic Message received 26 April 1999.

¹¹² Id

¹¹³ Id Note: Mr Bleak did not report how successful the City is with the Clean Cities program. He only stated that they participate. Many cities and corporations have alternative fuel vehicles that primarily burn gasoline because it easier for the employees to fuel the vehicle. After working with a State agency, I found that many employees didn't like the method used for fueling with alternative fuels. Especially, if you had

recognized as one of the leaders in "clean" practices.¹¹⁴

Finally, Mr Bleak's reason for his very short response to the author's long list of questions becomes clear with his extremely important concluding comments which significantly impact the hypothesis of this paper. He states:

"I wish that I had some better answers to your questions--I am relatively new at the City and would like to centralize the information and programs that are being administered. For your information--just recently we have been discussing how we should be handling environmental problems and concerns. We have a lot of expertise but it's spread out through all of the departments and there isn't much coordination as I would like."¹¹⁵

Mr Bleak is heading in the right direction with his concerns. I will discuss in more detail in the "Conclusion" section of this paper where the City could benefit from Whiteman's program. However, until the City has a centralized office and established goals, they are going to continue to waste resources and lose revenue.

B. The County

Ted Sonnenburg, the Pollution Prevention Coordinator and Solid and Hazardous Waste Specialists with the Salt Lake County Health Department states that the key participants in the program are the agency directors, his boss and himself.¹¹⁶ The County seems to be in a reactive mode with P2. Mr Sonnenburg reports that they are not focused on P2 aspects pertaining to waste stream elimination, but rather ensuring businesses

to connect a tube to a metal receptor and not know exactly how much to put in. Therefore, although the agency had the vehicles and the possibility, they were primarily using standard gas.

¹¹⁴ Id

¹¹⁵ Id. Mr Bleak went on to state that he would be interested in reading this paper, hopefully it would give them some ideas.

¹¹⁶ Ted Sonnenburg, Pollution Prevention Coordinator and Solid and Hazardous Waste Specialists with the Salt Lake County Health Department, Telephone interview conducted 21 April, 1999

handle wastes properly.¹¹⁷ He attributes the rationale for their focus on the limited budget and lack of manpower.

According to Mr Sonnenburg, the Department is more of an enforcement agency. They have devised an audit program and selected 13 industry classifications with historical problems with waste management (automotive for example). The Department held a workshop to educate the businesses on how to properly manage waste. Vendors attended the workshop to show what P2 equipment they had to offer.¹¹⁸

The way the Department inspects the businesses also has changed. They used to select businesses randomly and consequently, not inspect everyone. Now they do inspect each business on their list, which puts everyone on a level field because no competitive advantage can be achieved by not complying and avoiding detection by not getting inspected that year.¹¹⁹

The Department does work to give businesses better ideas as to how to properly manage their wastes. They also are a more understanding enforcement agency according to Mr Sonnenburg. They allow a 30-day grace period before enforcement action is taken. As Mr Sonnenburg put it, "we try to weed out the bandits from simply uninformed business owners."¹²⁰

Mr Sonnenburg does want the focus of the program to change. He says they are now focusing on the immediate threat because of manpower, but they have the capability of working with businesses to eliminate waste streams. They want to encourage business to change their practices. The Department is creating an Envirostar program. This program

¹¹⁷ Id (Sonnenburg)

¹¹⁸ Id

¹¹⁹ Id

¹²⁰ Id

modeled after one in Seattle, Washington would recognize through awards and media attention, those businesses who "go the extra mile initiating P2."¹²¹

When asked if the fact that the County is not implementing some of these P2 programs in their own facilities and programs might have a negative effect on industry's desire, Mr Sonnenburg replied that yes it may have an impact. However, he was quick to point out that P2 makes sense and you can save money and time and he hopes the County will eventually come around.¹²² Furthermore, he states that the decisions as to what P2 methods to use are left to the department heads. The focus is still on compliance and as long as the agency is in compliance, they are satisfied. He believes "it could be an awareness problem and that people don't like change and if presented they were consider it [changing to a P2 method]."¹²³

Mr Sonnenburg, when asked why oil filters went to landfills in this County, replied that it is in compliance with the law and it is up to the agency directors to decide. There is no centralized office in the County that co-ordinates these issues.¹²⁴ He would prefer that the filters are recycled "because even crunching [the filters] does not get all the oil out and then we send it to a landfill."¹²⁵ He also stated that there had been an attempt to get the legislature to impose restrictions on landfill dumping from the landfill community, but the attempts died.¹²⁶ Filter recycling is now an option in the County now that New Life and another company, Oasis, have established businesses in the County.

¹²¹ Id

¹²² Id

¹²³ Id

¹²⁴ Id

¹²⁵ Id

¹²⁶ Id

Mr Sonnenburg reports that six months ago this wasn't even an option. However, there is no plan to change the current method of landfilling.¹²⁷

Finally, Mr Sonnenburg was asked why the tipping fees are so low in the County.¹²⁸ He replied that this issue is always being looked at and that rates have raised steadily. He acknowledges that lower tipping fees are an incentive not to recycle and there is the ideology that "we have the space to landfill." Furthermore, politics are involved and many people think that raising rates is a form of a tax and fight this issue.¹²⁹

The County is still in the compliance mode. It is ironic that as Mr Sonnenburg put it, "P2 makes sense, you can save money and time....," and yet, the County is not actively pursuing any of these benefits themselves. They are creating a new program to recognize industry for P2, but not setting goals for their own operations. If the budget and personnel are obstacles to working toward P2 initiatives, then P2 is quite possibly the answer to the County's problems. P2 will save them thousands of dollars and allow them to use personnel more effectively and efficiently.

The author also spoke with two county offices that are heavily involved with waste streams and have the opportunity to eliminate or reduce these streams.

C. The Salt Lake City Fleet Management Division

As we all know, vehicles generate a myriad of waste streams including oil, solvents, antifreeze, part washer fluids, oil filters and refrigerants. A city the size of Salt Lake City is also responsible for maintaining several municipal vehicles. Who manages the

¹²⁷ Id

¹²⁸ See Margaret Grochocki interview under the green waste section of this paper for a discussion on tipping fee costs and revenues

¹²⁹ Supra note 116

vehicles and how generated wastes are processed and recovered is the subject of this section.

The Fleet Management Division is responsible for virtually all of the city's vehicles and motorized equipment. The Division services the fire, police, water and parks departments as well as the garbage trucks, snowplows and all motorized equipment (lawn mowers, etc).¹³⁰ Mr Dave Lyon, the Heavy Shop Service Manager for the Fleet Division, states they handle all of the city's vehicles except for the airport vehicles.¹³¹

The centralizing of the Division also creates the centralizing of certain waste streams and their processing. The City does recycle, but as the following discussion shows they rely heavily on contractors. Mr Lyon reports that they receive and process the following waste streams:

a. **Used Oil** - The Division replaced its underground storage tank just this year, with an above ground bulk tank that has a 400 gallon capacity. They receive about 350 gallons a month of used oil. They contract with a company to pick up the oil for recycling. Mr Lyon believes the oil is used for heating, but states it does not come back to his facility for use as oil or for heating.¹³²

b. **Antifreeze** - The Division collects approximately 400 gallons of antifreeze per year. They store it in 55-gallon drums. Once again, they pay a company to come in and haul the antifreeze away for recycling and they do not get any of the recycled product.

¹³⁰ Dave Lyon, Heavy Shop Service Manager, Fleet Management Division (Telephone Interview conducted on April 2, 1999).

¹³¹ Id

c. **Parts Washers** - They use the Safety Kleen parts washers "because of EPA and they want to make sure it is handled correctly."¹³² The Division is looking for environmentally safe chemical washers. In fact, they have tried a couple of demonstration models, but haven't converted to any new system at this time.¹³³ Additionally, they looked at an ultrasonic parts washer that uses water and mild detergent but the expense was just too high.¹³⁴

d. **Oil Filters** - This area is a disappointment. The Division drains the filters and then sends them to a land fill in accordance with current EPA regulations. Mr Lyon had never heard of the Kruncher machine and said it sounded interesting.¹³⁵ However, if you are not putting the used oil back into service yourself, or sending the compacted filters off to market, the incentive to find and try new equipment would naturally be low.

e. **Air Conditioning Refrigerants** - Finally an area where the City does do a complete loop system themselves. They extract, clean, dry and reuse the refrigerants and have been recycling them for sometime.¹³⁶ No explanation as to why this particular system was selected to be kept in-house, however, this is a step in the right direction.

f. **55-Gallon Drums** - If the drums contain hazardous waste they have a contractor come and remove the drums for proper disposal. However, they do reuse serviceable drums that contained non-hazardous waste. The Fleet cleans these drums and

¹³² Id

¹³³ Id (Lyon interview)

¹³⁴ Id

¹³⁵ Id

¹³⁶ Id

¹³⁷ Id

puts them back into use. If a drum that contained non-hazardous waste is not serviceable, then the Fleet cuts up the barrel and sends it for recycling.¹³⁸

Mr Lyon also pointed out that their goal is to have zero hazardous waste. He stated that they do a lot of recycling in the facility. They recycle cardboard, aluminum, metals and steel. Additionally, they have a steam cleaning wash rack with an environmentally friendly oil water separator.¹³⁹

The centralizing of vehicle and equipment maintenance makes perfect sense. Unfortunately, even though they are recycling materials they aren't seeing any real benefit from it. This lack of knowledge as to what can be realized through recycling programs has a chilling effect on initiative. The Division relies heavily on contractors so why consider options when the material is going to be taken care of by someone else.

For example, the land filling of oil filters is a missed opportunity. The Fleet Division handles thousands of oil filters per year. They do drain the oil, which is required by law before the metal filter can be placed in a landfill. But the actual placement in a landfill is not necessary. The Division could invest in the Kruncher machine or a similar method that compacts the drained filters and then send them off to generate revenue by being recycled. A machine that could perform this task could be purchased cheaply compared to the waste they are creating now. This entire waste stream can be diverted from the landfills, yet no action is being considered at this time to do so.

Additionally, the used oil can be recycled and some of it could be used in smaller equipment such as lawn mowers. The oil could be used to heat the facility and reduce energy costs. Finally, Mr Lyon was not aware of any goals for the facility regarding

¹³⁸ Id

¹³⁹ Id

recycling other than they wanted to have zero hazardous waste. He did not know if the Division had specific goals for eliminating certain amounts of a waste stream per year.¹⁴⁰

If the employees don't know of any goals the organization has for reducing recycling, it appears that it is not a priority and employees will not put the effort into innovation. The EPA makes this point in its discussion of a successful P2 program. The EPA correctly asserts that management must be clearly supporting the program to get it the attention it deserves. In order to do this; the employees must be kept informed of the goals and objectives.¹⁴¹

A goal that is stated by the City and County, is to have green waste recycled. Green waste is a recyclable material by nature--literally, yet the county does not do any curbside green waste pickup. Our discussion turns to the issue of green waste in the next section.

D. Salt Lake County/City Green Waste

The Salt Lake Valley Recycling Information Office has a compost operation for green waste, as do both area landfills. According to Margaret Gochocki, the Public and Recycling Information Officer, they encourage people to perform grass recycling.¹⁴² Grass recycling is simply leaving the cut grass on your lawn and let nature take its course.

Ms. Gochocki is proud of their community outreach programs. In 1998, they had an advertising and informational campaign regarding composting and the benefits it

¹⁴⁰ Id.

¹⁴¹ Supra note 49

¹⁴² Margaret Grochocki, Public & Recycling Information Officer for the Salt Lake Valley Recycling Information Office. (Telephone Interview conducted 1 April, 1999)

produces. They offered compost bins for sale and to her amazement and delight, they sold over 2,600 bins to the general public.¹⁴³

The composting program they run uses the wind rows method. This method consists of laying the waste outdoors in long rows, adding nitrogen and turning the mixture to keep it moist.¹⁴⁴ The process takes roughly two months to complete. Ms. Grochocki states that the resulting compost is "not pure, but it fits a unique niche here in the valley because the soil is so sandy or it is clay and our product is reasonably priced."¹⁴⁵ The program diverts an average of 20,000 tons per year from landfills.¹⁴⁶

A four- year cost comparison of the composting project between 1995 and 1998 reveals that the program is generating revenue. In 1995, for example, the program generated \$120, 271 while in 1998, \$303,670 was raised.¹⁴⁷ A copy of the one page report can be found as figure 5 attached to this paper.

A monitoring program at the landfills has been established to watch for recyclable material when the loads are being dumped. However this is not an all-inclusive thorough program. Personnel will only retrieve large recyclable materials and divert them.

When asked about an in-vessel composting procedure, she said she was familiar with the process and said it would be a useful piece of equipment. However, the wind row method is meeting their needs at this time because they have the space.

The in-vessel would do away with the space issue because the compost is made in the machine in 72 hours. You don't have to utilize large amounts of land for months at a

¹⁴³ Id.

¹⁴⁴ Id.

¹⁴⁵ Id.

¹⁴⁶ Id.

¹⁴⁷ Salt Lake Valley Solid Waste Management Facility, Compost Project Summary, document provided by Ms. Grochocki, Supra note 119.

time to wait for a finished product. And as Ms Gochocki stated, the quality of their product is not pure.¹⁴⁸

E. Salt Lake Valley Solid Waste Recycling Program

Six cities in the Valley do curbside recycling: Salt Lake City, West Jordan, South Jordan, Riverton, Draper, and Sandy.¹⁴⁹ The majority is at the south end of the valley. Ms. Grochocki's theory as to why the majority is at the south end is because these are rapidly growing communities with many new families from outside of Utah. She suspects many of them came from cities that recycled and are willing to pay for the service. She stated many other areas simply aren't willing to pay for curbside service.¹⁵⁰

She also stated that recycling is not economically feasible to cover costs in Utah at this time. There are two major reasons why this is so; no remanufacturing company here so the material must be shipped out of Utah, and 2) the valley's low tipping fees.¹⁵¹ A brief look at both of these issues is warranted.

Presently, the Salt Lake Valley collects recyclable material. There are three separate contractors who collect the material. BFI Recyclery handles West Jordan, Sandy and Salt Lake City; and independent company collects Drapers material and South Jordan and Riverton are collected by another independent. The recycling processing centers in Utah sort the material, bale it and then ship the material out of Utah to be remanufactured. The county is trying to encourage a remanufacturing company to start a business in Utah, which would dramatically reduce the shipping costs and also bring jobs to the valley.¹⁵²

¹⁴⁸ Supra note 142

¹⁴⁹ Id.

¹⁵⁰ Id.

¹⁵¹ Id.

¹⁵² Id.

Shipping the material costs money and makes the venture less profitable.

These costs effect greatly the second factor regarding the profitability of recycling in Utah--tipping fees. Tipping fees are what the landfill charges a waste hauler to "tip" their waste into the landfill. Tipping fees have been increasing nationwide and this has caused communities to look to recycling. However, the valley has one of the lowest tipping fees in the nation, just \$22.00 per ton.¹⁵³ Salt Lake City and the County each make a dollar per ton as well.

Ms Grochocki states that the cost of land filling, once all the taxes, etc., are taken out, is only \$16.00 per ton--again "one of the cheapest in the nation."¹⁵⁴ She also notes that the valley has the space to landfill. Her facility has an estimated 30 more years and the other two landfills in the valley have similar expectancies.¹⁵⁵

This is an unfortunate reality. It is cheaper to landfill the waste than to recycle it and the market for recyclables at this time isn't commanding top dollar. The answer may be in what the county is already trying to do. That is, get a company into the area that remanufactures the material. This will save shipping costs, but is only half the answer. The tipping fees need to be increased to make using landfills less desirable. This will have several impacts. First, it will divert recyclable materials from the landfills. Second, this action will raise additional tax dollars (the city and county would just raise the assessment and possibly get up to \$3.00 per ton). Third, the landfill life would be extended to far longer than 30 years for materials that must be landfilled. Fourth, some of this money could off set curbside recycling costs and open the service to more communities. Creating curbside recycling in new areas would make it easier for these

¹⁵³ Id

¹⁵⁴ Id

¹⁵⁵ Id

people to participate in the recycling program. Finally, it is the socially responsible action to take by eliminating a large portion of the waste stream.

F. CONCLUSION

The hypothesis at the beginning of this research was that the Air Force was doing more in the area of P2 than the City and County of Salt Lake. The purpose was not to show that Salt Lake was not doing a good job, but rather to use them as a representative sample since this is where I was doing the research. I used just one Air Force Base in the case study and compared it to one city and county.

The findings were remarkable. Whiteman AFB is far exceeding anything that the County or City is doing. In fact, the County and City have poor programs with no apparent motivation to change their wasteful methods.

The City and County to establish a viable P2 program that will significantly reduce waste streams while creating revenue could implement the following observations and recommendations:

1. Centralize Management of the Program

Both the City and County representatives, Mr Bleak and Mr Sonnenburg state that there is no central management of the P2 or environmental functions in their organizations. Mr Bleak would like to centralize the information and programs that are being administered and realizes that this is a major defect toward any potential successful program.¹⁵⁶ Mr Sonnenburg highlighted the fact that the programs are left to the

¹⁵⁶ See Supra note 111

individual department/division chairpersons and that no central office to coordinate these activities exists.¹⁵⁷

Without centralized management, there cannot be any organizational goals or objectives set. Nor is there any opportunity to see if one divisions wastes could be another's gain.

The benefits of centralizing management of a P2 program are evident through Whiteman AFB's program. P2 Central and the RRRP are managed by Mr Ken Nugent and his Environmental Flight. Mr Nugent works for the base civil engineer who reports to the support group commander. The support group commander reports to the wing commander who is in charge of the entire base and its operations. Mr Nugent's folks meet with the shops and divisions to review the programs and look for opportunities to improve. Their ideas are brought to the Environmental Council, which consists of commanders and the vice wing commander who has delegated authority for most decision-making in the environmental arena.

The Whiteman approach works because the workers and management have designed the program and all have a vested interest in its success. The information flows both ways in the hierarchy and the efforts are collective in nature. It is possible to identify issues, prioritize them and to set goals and objectives. More importantly, this method allows for the measurement of results and the ability to improve the program.

Unlike Whiteman, the City and County are haphazardly attempting P2 and their subordinate organizations literally have no idea what the others, or management, is doing to facilitate progress. Without a coordinator and centralization of the programs, the City

¹⁵⁷ See supra note 116

and County can not realize but a small fraction of their potential. This failure results in a major waste of resources and taxpayer money.

2. Change mindset

Ms Grochocki states that the cost of land filling, once all the taxes, etc., are taken out, is only \$16.00 per ton--again "one of the cheapest in the nation."¹⁵⁸ She also notes that the valley has the space to landfill. Her facility has an estimated 30 more years and the other two landfills in the valley have similar expectancies.¹⁵⁹

Mr Sonnenburg notes that the County is devising an awards recognition program for businesses that implement P2 initiatives, but also admits that the County isn't implementing many of the P2 initiatives it could. He further states that manpower and budgets don't allow for a full program at this point.¹⁶⁰ The City doesn't even appear to have a grasp on its P2 direction. Mr Lyons shop demonstrates the County's reliance on contractors.

All of these examples display contentment with the status quo. The County and the City are not looking into the future, but rather what is currently taking place. Emphasizing landfilling by having some of the lowest tipping fees in the nation, while also suggesting that the action be warranted because the valley has the space to landfill should be offensive to County and City residents.

Admittedly, lower tipping fees result in lower trash collection costs to residents. However, diverting items from landfills and creating revenue can also lower taxes and allow for the building of recreational facilities and other projects at reduced costs. A

¹⁵⁸ Supra note 142

¹⁵⁹ Id

¹⁶⁰ Supra note 116

proactive government in this arena could identify a myriad of opportunities for reducing and reusing materials, thereby saving money.

Mr Sonnenburg, as mentioned above, suggested that budgets and manpower don't allow for a full County program at this point.¹⁶¹ The mindset is simply that the County can't afford to do a P2 program. Yet, if the County invested in such a program they would reduce costs while generating revenue and eliminate waste streams. The mindset should be that the County can not afford not to pursue a P2 program.

Landfilling should not be the primary method of waste treatment. Unfortunately, it is in both the County and the City. The mindset appears to be that it is cheaper and easier, so let's not consider changing. Using all of the recommendations made in this paper can change the mindset. Again, it is ironic that the County wants to create a program that recognizes businesses for P2 accomplishments but does not set itself to be a model in the area--or even a major player for that matter.

3. Take a holistic view of existing program--

Whiteman AFB Environmental Flight members attribute much of the success of their program on their ability to take a holistic view of existing programs. They were able to identify waste streams and develop methods to either reduce or eliminate the waste. They had the opportunity to create new uses for the waste by reusing it in other installation processes.

The County and City need to take this same approach. They need to identify the waste streams they are currently producing and work to reduce or eliminate them all together. They may also find ways to collect wastes from different divisions and reuse it

¹⁶¹ Supra note 116

for a more profitable purpose. For example, collecting used oil and using it to heat facilities or schools.

Additionally, this would give the divisions/agencies the ability to share ideas and their success stories and problem areas. These actions could result in tremendous cost savings and would also help to achieve the other recommendations listed in this paper.

4. Establish goals and objectives -

As with any good program, one must have a means to measure its on-going status. Performing the holistic view and centralizing the program will allow for the establishment of realistic and attainable goals and objectives.

The County and the City could establish such goals as how much solid waste they want to reduce each year over the next five years, increase recycling tonnage by so much per year, recycle their own oil and anti-freeze, establish weekly curbside collection of yard waste, set priorities for investment in P2 equipment, just as an example of possibilities. The objectives are those steps that are set to reach the goals. For example, analyzing and listing the necessary step to establish curb side recycling of yard waste.

The goals can also be used to estimate potential revenue from the program. Potential revenue can dramatically effect the goal for the subsequent year by helping to prioritize projects. Finally, goals will call for the continued review of the program to ascertain if certain segments can be accomplished in a more efficient manner and they can also identify new opportunities for waste reduction.

5. Focus on reducing/eliminating dependency on contractors

In the interview with Mr Lyon, it became apparent that the County is comfortable using waste contractors. Mr Lyon stated that by using the contractors, they are sure the job is getting done right and they don't have to worry about it.¹⁶² Additionally, in the discussion with Mr Lyon, it was clear that he is extremely knowledgeable about his shop, responsibilities, and procedures they use. Why is this important to this research? It shows that the County has the personnel who are capable of devising programs and running them efficiently.

If the County calculated how much money per year it spends on contractors and then worked a program to channel that money into a successful P2 enterprise, they would quickly turn an expenditure into a revenue source. Mr Lyons stated they don't have to worry about the used oil or anti-freeze because a contractor handles it. The opposite is probably more accurate. Because your own people, who can easily be trained on recycling methods, aren't performing the task, the County doesn't have any control over the actual procedures.

This fact becomes more important under RCRA which has the cradle-to-grave responsibility. In other words, even if you have a contractor dispose of the waste, you as the generator will still be held liable for any improper disposal. Furthermore, there are other areas where noncompliance can occur. For example, part of the cradle-to-grave system is the proper completion of the manifest.¹⁶³ The generator must get a completed copy of the manifest from the treatment, storage, and disposal facility (TSDF) and if the receipt is not received, the generator can be in violation.

¹⁶² Supra note 130

¹⁶³ 42 U.S.C.A. § 6922 (a)(5)

Recycling waste does away with all these administrative costs and potential areas for violations and fines. In fact, under RCRA many recycled materials are exempt from RCRA provisions if they have been discarded in a certain manner.¹⁶⁴ Regarding the used oil for example, if the contractor is taking the oil to be recycled, then RCRA would not apply. However, if the oil is going to be disposed, then the RCRA procedures would have to be followed. The question is why pay the contractor to do a function that the County and City can do themselves with more control and turn into a revenue generator?

6. Make landfilling less attractive -- raise tipping fees

All of the individuals that were interviewed about tipping fees acknowledge that this is a large hurdle in the quest for a stronger P2 program.¹⁶⁵ Having one of the lowest tipping fees in the nation should not be anything to be proud of and in fact, it may invite other surrounding states to use the landfills or initiate litigation to use them.

The low tipping fees is a disincentive for creating a P2 program for industry and the government. If it is cheaper to dump the waste than recycle it, the mind set required for a change is harder to stimulate. Industry is focused on short-term goals of increasing profits. Increasing tipping fees will force industry to look for other options. Ironically, it will encourage them to look at P2 programs and work to reduce their waste streams which is obviously better for the environment than dumping large amount of waste.

¹⁶⁴ 40 C.F.R. § 261.2 (b). The four ways the code states that materials may be exempt from RCRA if they were 1) used in a manner constituting disposal; 2) burned for energy recovery or used to produce fuel; 3) reclaimed; or 4) accumulated speculatively. Furthermore as stated in the code and also discussed in Olga > Moya and Andrew L. Fono's book *Federal Environmental Law: The User's Guide*, (West 1997) at p. 97, "recycled material is not a solid waste if: 1) it is used or reused as an ingredient in an industrial process to make a product; 2) used or reused as an effective substitute for a commercial product; 3) returned to the original process that generated it without first being reclaimed; and 4) reclaimed and returned to the original process, but only if tank storage is used and the reclamation process occurs in a closed loop system that does not involve controlled flame combustion." The point of this note is to show that there are ample opportunities to reduce the waste stream and to do away with unnecessary manifest and liability.

7. Invest in P2 machines/procedures -

The machines discussed in the Whiteman P2 section are just a few of the machines that are on the market. The Whiteman discussion proves that these purchases truly are an investment with both short and long-term dividends.

Whiteman realized positive returns from its investment in just two years. The machines can be prioritized for purchase based on the types of goals and projects that the City and County are considering. The estimated "pay back" time can be calculated based on the amount of product processed and the elimination of contractor costs. Furthermore, if the product is reused, the additional savings are found by not having to purchase new materials.

Political entities should relish the opportunity to reduce waste and create revenue. These machines and procedures can achieve these goals while helping to protect the environment. Such purchases would be a wise investment of taxpayer money and the impact of the process could be easily measured to show advances.

8. Create incentives for employees and citizens --

Incentives can come in many forms such as award programs; cash for suggestions, the creation of park or similar projects based on money derived from recycling. According to Mr Sonnenburg, the County is creating an awards program for industry. The purpose is to entice members of industry to participate and implement P2 initiatives.

Interestingly, the County has no such program for its own employees when it comes to P2, nor does the City. Encouraging employees to submit P2 money-saving

¹⁶⁵ Interviews with Sonnenburg, Grochocki, and Bleak supra.

ideas and receive cash awards does have a positive impact. Employees are willing to make the extra effort if they are going to receive cash and an award citation for their personnel files.

The Air Force does have such an awards program. However, none of the civil engineers have put in for the awards to the author's knowledge. They undertook the challenge as a professional matter and worked to truly improve the system.

Incentive programs can also work for the community. The program would have to give a goal for the community to strive for, such as so much money raised will enable us to build a new park or library. The City and County could recruit special interest groups, clubs, businesses and other organizations to help promote the project and the progress. Every other week, the progress can be shown in chart form for example, in the newspaper. In other words, put the goal of a new park, etc. at the top of the graph and show the amount of recycling dollars generated for the project. Give the community something specific to work for and a tangible benefit. Make them think twice about throwing a can in the garbage versus recycling it. And of course, once this goal is achieved make a tremendous issue out of the success and then ask for inputs for the next community-recycling goal and continue the process.

Creating incentives will allow for better ideas from participants, a greater willingness on behalf of the community to participate and a better understanding of the impacts of recycling. It is not necessary, although desirable, that the community understands all the benefits of recycling or that they are doing it to help the environment. In fact, if their only motivation were to work toward the community project goal so they can see a direct benefit--this would be acceptable. It would be acceptable because they

are accomplishing the primary purpose of the P2 program by participating in the community project.

9. **Advertise reuse methods and elimination of waste streams**

Getting the word out can be more important as "the word" itself. Once industry and the community understand the investment the City and County are making and the returns that are realized from the investment, a greater interest for P2 initiatives will develop. Demonstrating how the City or County Fleet Services diverted a waste stream and reduce costs will put greater influence on industry to follow suit. Especially, if the process can be easily demonstrated to them.

Taxpayers will be pleased that the City and County are avoiding expenditures and creating new revenue sources. This fact will be more appreciated when coupled with the environmental impacts. Environmentalist will also be pleased and hail the City and County as forward thinking and creating a better place to live and enjoy. With the upcoming 2002 Olympic Games approaching, such a reputation would place Salt Lake City and County in an extremely positive light throughout the world. Furthermore, such a reputation would fit very well with the breathtaking natural surroundings of the area.

10. **Make recycling easy for communities**

Not only should you create incentives for the communities, the City and County must make the process of recycling very easy. There needs to be more curbside recycling throughout the area. The County and City need to supply the recycling bins with some easy to read pamphlets explaining what is and isn't recyclable. The recycling pick-up day

needs to be on the same day as trash day. The recycling trucks could have a chart showing progress towards the goal posted on its side.

Recycling can be shown as a family event with the kids involved with the process of sorting and bringing the containers to the curb. Schools should participate heavily and educate the children on the process and importance of recycling and let the children know of the community goal they are all working toward. The children will in turn put the emphasis on recycling and encourage parents to comply.

The County and City could also give some incentives to builders who put a mini recycling center in new homes. Such a center could simply be a lower cabinet in the kitchen that has a pull out feature with four bins to help sort recycling. This way the homeowner can sort recyclable materials in their kitchen in an out of the way place. In other words, it is convenient and easier for them to perform.

These suggestions can lead to a successful P2 program for the County and City of Salt Lake. The ideology must move from contentment with the status quo, to accepting challenges for the future that will benefit the economy, revenue and the environment.

Whiteman AFB has demonstrated the program can and does work. They have reduced and eliminated waste streams, reduced the workload for other departments on the installation, created a better managed program and significantly decreased the opportunity for environmental violations. Whiteman has done all of this while saving considerable amounts of money, an important factor in these days of ever decreasing budgets.

The County and City are not striving to comply with congressional intention. The PPA¹⁶⁶ states that "Pollution should be prevented or reduced whenever feasible...Pollution that can't be prevented should be recycled in an environmentally safe manner...disposal or other release into the environment should be employed only as a last resort."¹⁶⁷ The County and City are not actively pursuing the prevention of pollution, although it is extremely feasible for them to do so. They are also using land disposal as a primary choice versus a last resort because it is cheaper and they have the room.

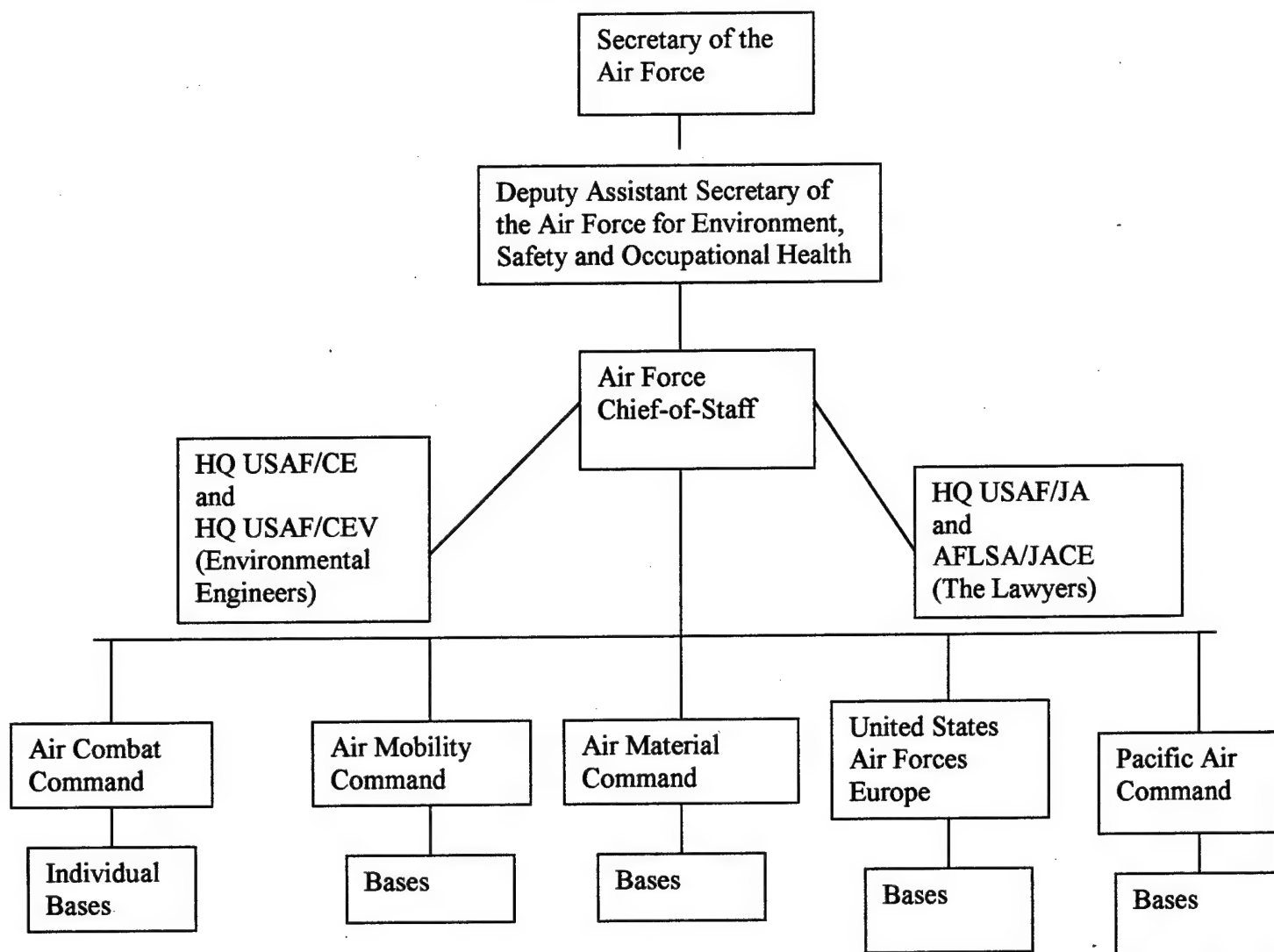
The County and City of Salt Lake can choose to alter their course and easily implement these programs and realize a positive impact almost immediately. Unfortunately, the two have currently made the choice to just comply with the minimum requirements rather than surpassing them and having a greater impact on the health of the environment and humanity. There are excuses for allowing the continuation of the existing poor program. However, these excuses are very costly...both to the environment and the budget.

¹⁶⁶ Supra note 2

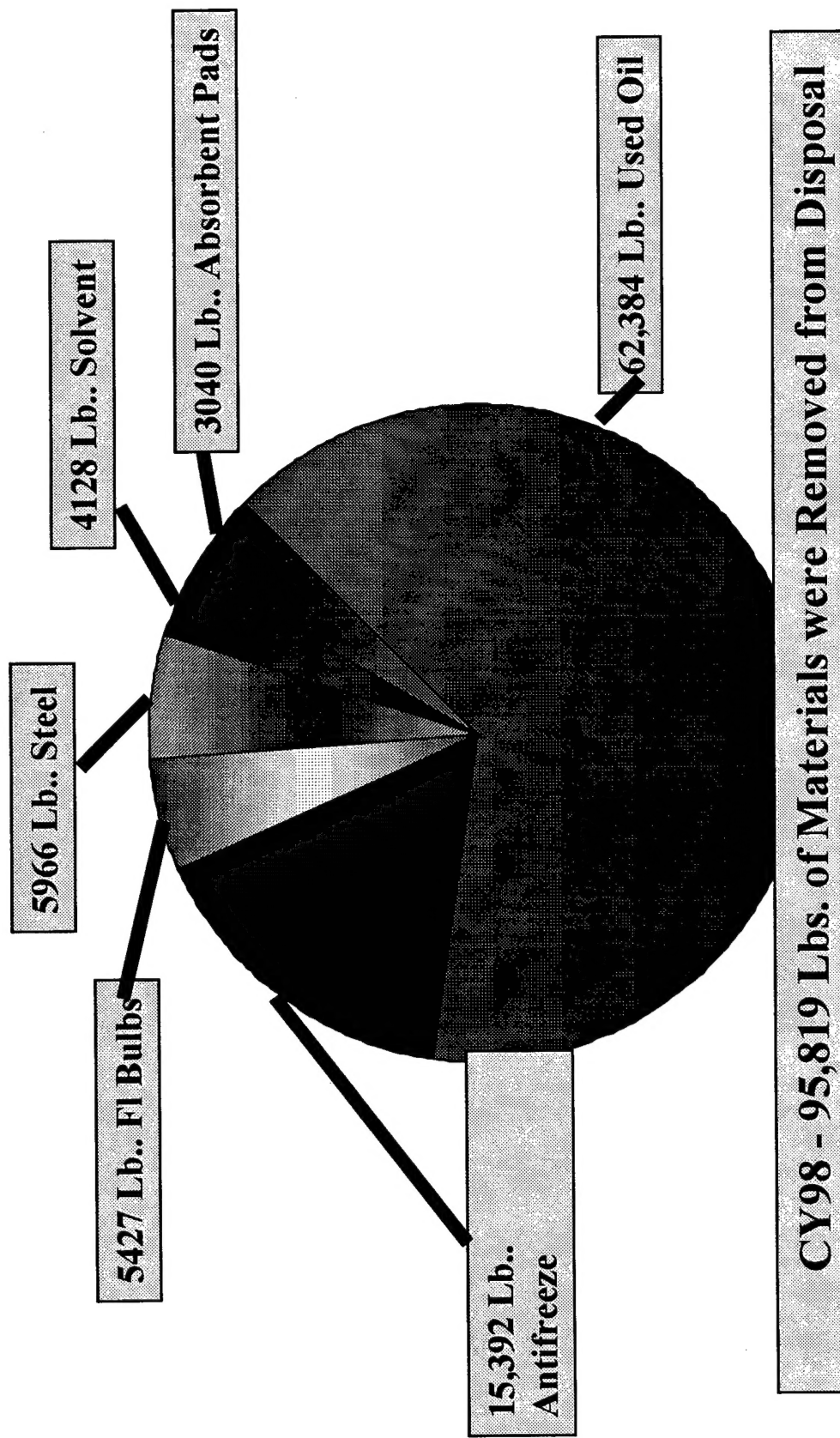
¹⁶⁷ Id.

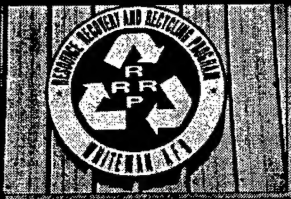
AIR FORCE ENVIRONMENTAL CHAIN OF COMMAND

(figure 1)



POLLUTION PREVENTION





RESOURCE RECOVERY RECYCLING PROGRAM

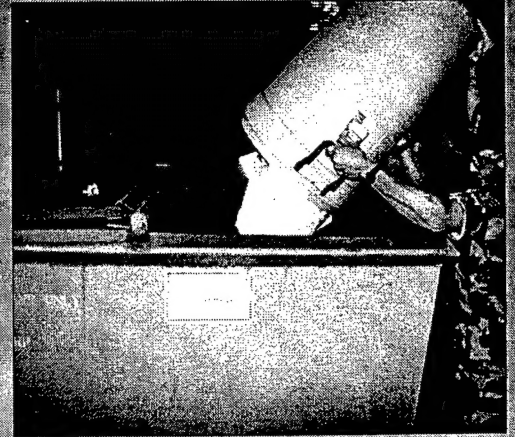
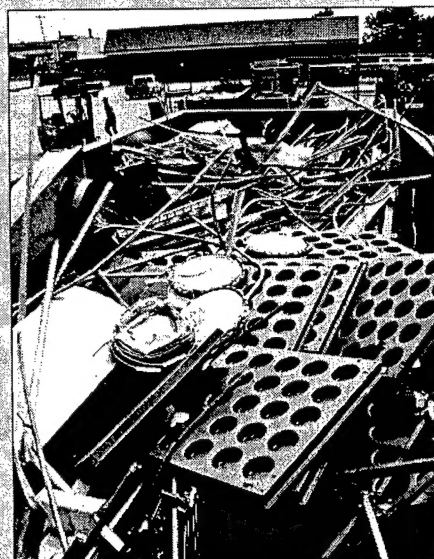


The Drop Off Center is open 24 hours a day, 7 days a week to base personnel. This facility offers Drive-up convenience for easy unloading of recyclable material (left).

RRRP offers curbside pick-up which includes the pick-up of yard waste as long as it is in bundles or in paper bags. RRRP also provides a drop off container for personnel to use 24 hours a day, 7 days a week (below).



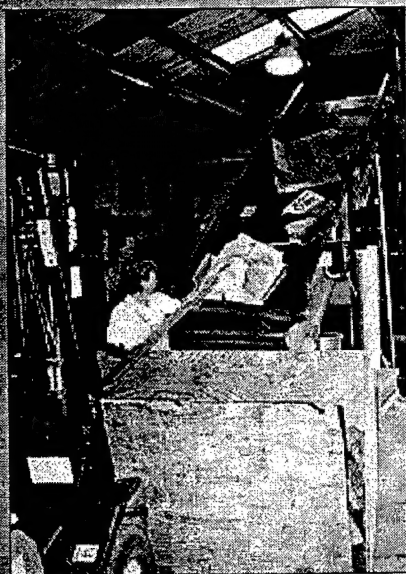
Steel is collected in open drop-off containers. Base personnel are allowed to load their material directly, however, if the load is too heavy or large, RRRP staff provides some assistance (below).



RRRP puts the responsibility of recycling on the individual by providing each employee with an "I'm a Recycler Box" at each desk. When their boxes become full, they can take the paper products to a central location within their building where there are larger storage containers available (above).



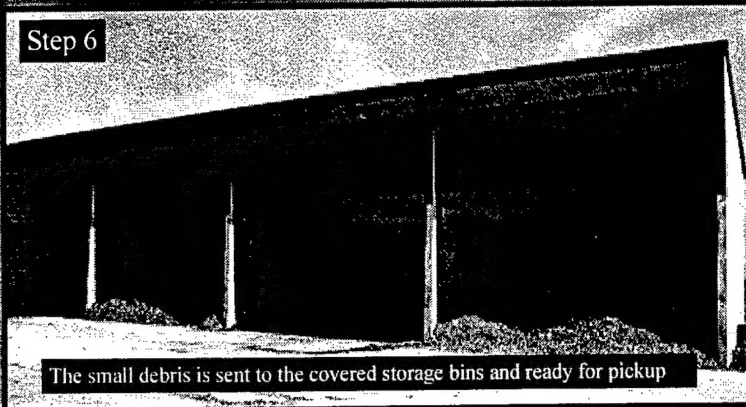
The aluminum and tin cans are dumped on the conveyor of the can crusher using the self-dumping bins. The cans travel up the first conveyor where they are separated by a magnet. The aluminum cans are crushed immediately and fall into the first self-dumping bin. The steel and tin cans skip the first crusher and are sent up the second conveyor to the final crusher (above).



Due to limited amount and cost of space available, a lot of recycling involves crushing, breaking, and smashing in order to maximize space. This is the horizontal baler that processes all the paper products (above).

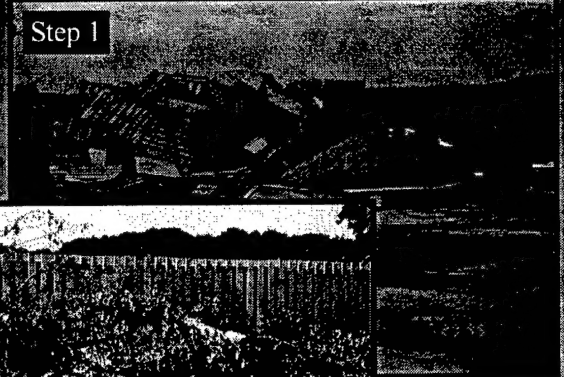
INNOVATIVE COMPOSTING OPERATION

Step 6



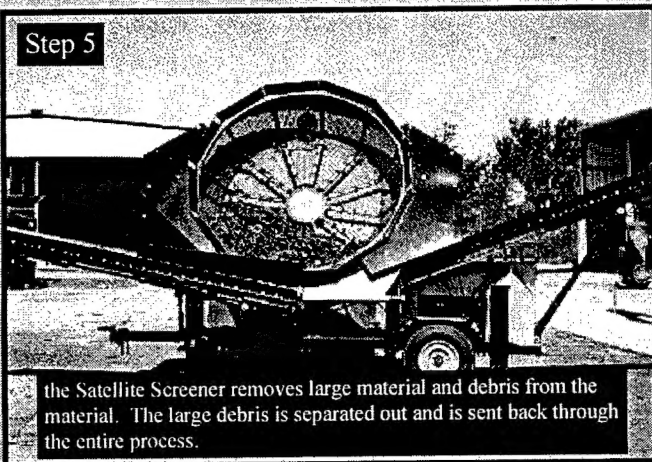
The small debris is sent to the covered storage bins and ready for pickup

Step 1



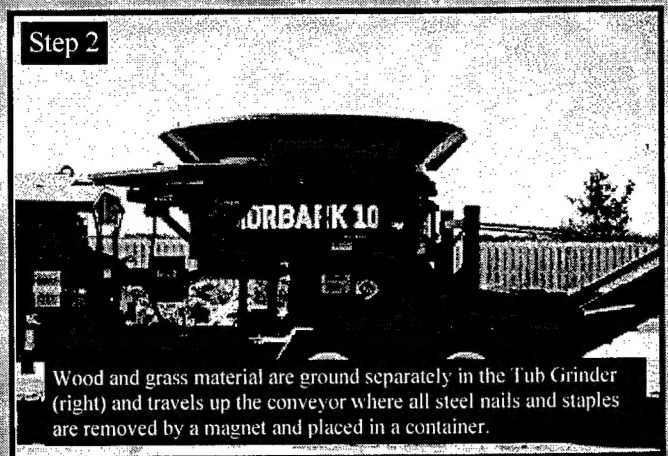
Yard and wood waste are collected in a central location and stockpiled to make handling easier.

Step 5



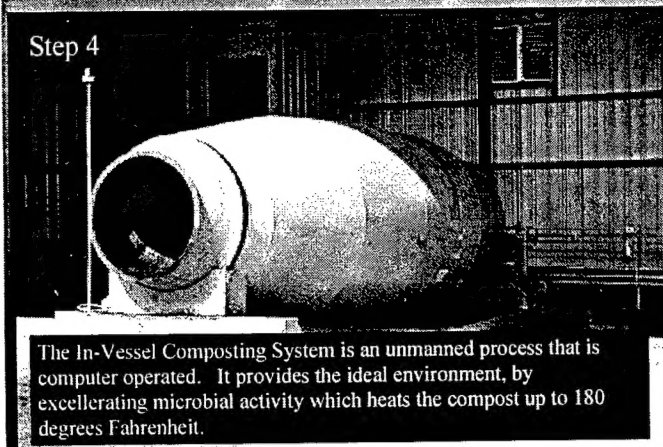
the Satellite Screener removes large material and debris from the material. The large debris is separated out and is sent back through the entire process.

Step 2



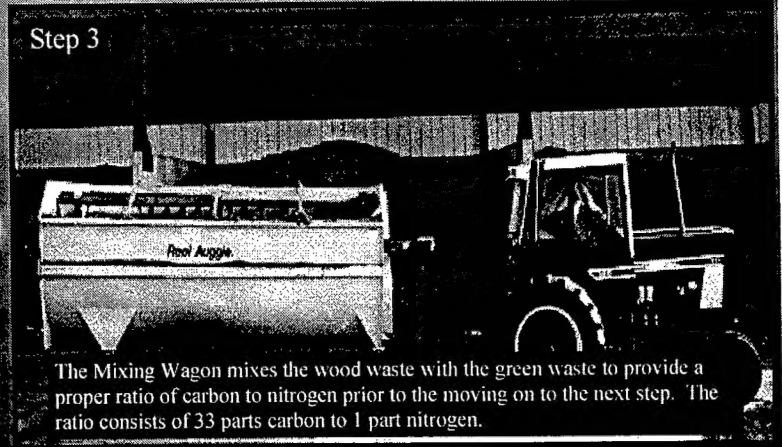
Wood and grass material are ground separately in the Tub Grinder (right) and travels up the conveyor where all steel nails and staples are removed by a magnet and placed in a container.

Step 4



The In-Vessel Composting System is an unmanned process that is computer operated. It provides the ideal environment, by excellerating microbial activity which heats the compost up to 180 degrees Fahrenheit.

Step 3



The Mixing Wagon mixes the wood waste with the green waste to provide a proper ratio of carbon to nitrogen prior to the moving on to the next step. The ratio consists of 33 parts carbon to 1 part nitrogen.

Salt Lake Valley Solid Waste Management Facility
Compost Project Summary
4 Year Summary

	1998 TOTAL	1997 TOTAL	1996 TOTAL	1995 TOTAL
Incoming Tonnage	19,324	20,557	20,115	18,759
COST				
Labor	\$103,605	\$102,840	\$94,433	\$89,012
Equipment	\$163,707	\$183,038	\$193,237	\$198,311
Total Cost	\$267,312	\$285,877	\$287,670	\$287,323
Unit Cost/Ton to Produce	\$13.83	\$13.91	\$14.30	\$15.32
REVENUE				
Disposal Fee \$16/T or \$6/pickup	\$267,513	\$257,410	\$241,060	\$203,480
Sales - COMPOST	\$216,173	\$253,865	\$200,319	\$122,528
Sales (Tons) \$15/T, \$18/T, \$24/T	10,047	12,958	8,154	7,983
Product (Tons) Used on Site	2,000	1,350	2,000	1,310
Cost @ \$5/T	\$10,000	\$6,750	\$10,000	\$6,550
Subtitle D Space Savings @\$4/T	\$77,296	\$82,227	\$80,364	\$75,036
Total Benefit	\$570,982	\$600,252	\$531,743	\$407,594
Net (Cost)/Benefit	\$303,670	\$314,375	\$244,073	\$120,271